U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE
NATIONAL METEOROLOGICAL CENTER

OFFICE NOTE 286

MARINE PRODUCT USER'S MANUAL

ANNIE L. BELL

JUNE 1984

ACKNOWLEDGEMENTS

Special thanks are extended to the Marine Products Branch of the National Weather Service (NWS), National Environmental Satellite, Data, and Information Service (NESDIS), NAVY/NOAA Joint Ice Center for their advice and contributions. Thanks to Mary Chapman for typing the manuscripts.

CONTENTS

I. List of Available Products

A. Global Sea Surface Temperature (SST) Analyses

1. Northern Hemisphere

2. Southern Hemisphere

3. Tropical

4. Semi-Monthly Anomaly

5. Seasonal Anomaly

B. Regional SST Analyses

1. NW Atlantic

2. Gulf of Mexico

3. Gulf of Alaska

4. Northeast Pacific

C. Ocean Feature Analyses

1. Oceanographic Analyses

a. NW Atlantic (Northeast U.S. coast)

b. NW Atlantic/Gulf of Mexico (Southeast and South U.S. coast)

D. Bathythermograph (BT) Temperature Analyses

1. Experimental BT SST (Northeast Pacific)

2. Experimental BT 100 meters (m) Temperature (Northeast Pacific)

E. NAVY/NOAA Joint Ice Center Analyses

1. Eastern Arctic

2. Western Arctic

3. Antarctic

4. Bering Sea - Chukchi Sea

5. Great Lakes Ice and Surface Water Temperature

F. Oceanographic Monthly Summary

G. Ocean Wave Measurements

1. Wave Spectra Measured by NOAA Data Buoy Center (NDBC) and National Ocean Service (NOS) Buoys.

FIGURES

GLOBAL SST ANALYSES

REGIONAL SST ANALYSES

OCEAN FEATURE ANALYSES

BATHYTHERMOGRAPH TEMPERATURE ANALYSES

NAVY-NOAA JOINT ICE CENTER ANALYSES

OCEANOGRAPHIC MONTHLY SUMMARY PUBLICATION

OCEAN WAVES MEASUREMENTS

MARINE PRODUCT USER'S MANUAL

Annie L. Bell
Marine Products Branch
Washington, D.C.

ABSTRACT: The Marine Product User's Manual has been written to provide brief descriptions and examples of the various marine products available from the Marine Products Branch at NMC. These products are distributed by mail, automatic telecopier, and facsimile. This manual represents the status of products developed by the Branch Staff over the past 7 years, as of April 1984.

INTRODUCTION

The functions of the Marine Products Branch are to develop and improve oceanographic and marine analyses and forecasts for the marine community.

The Marine Product User's Manual of the National Weather Service (NWS) provides information on our products and services. These products are available by mail, automatic telecopier, and facsimile. They are used by reseachers, private citizens, government agencies, fishermen, etc.

Analyses are prepared by both objective and subjective methods. Objective analysis methods use electronic computers which quickly transform a large set of irregularly spaced data into a set of regularly spaced data points. Hand drawn, subjective, analyses draw upon the experience of the analyst to interpret the validity of the data and occasionally to fill in data void areas. Analyses are disseminated in the form of contour charts generally in Mercator or polar stereographic projections.

EXPLANATION OF PRODUCTS

A. Global Sea Surface Temperature Analysis Charts are generated using objective techniques described by Gemmill and Larson (1979). The analyses are performed on alternate days for the Northern and Southern Hemispheres on a 129x129 polar stereographic grid (mesh length of 381 km at 60° (N/S)). The analysis technique is a "blend" of SST data from surface ship reports, fixed and drifting buoys, BT reports, and satellite derived SST data.

1. The Northern Hemisphere Analysis Chart (initiated in August 1978, fig. 1) is a 2-day composite of surface ship reports, fixed and drifting buoys, BT, and satellite (SAT) data. The polar stereographic chart covers the Northern Hemisphere to 10°N.

2. The Southern Hemisphere Analysis Chart (initiated in October 1978, fig. 2) is a 2-day composite of surface ship reports, fixed and drifting buoys, BT, and SAT data. The polar stereographic chart covers the Southern Hemisphere to 10°S.

3. The Tropical SST Analysis Chart (initiated in January 1979, fig. 3) is a 2-day composite of surface ship reports, fixed and drifting buoys, BT and SAT data. The Mercator chart covers the globe from 50°N to 50°S.

4. The Semi-Monthly Anomaly Chart (initiated in October 1979, fig. 4) is a 15-day composite analysis. It is available on the first and 16th of each month using the Robinson-Bauer climatology. The area covered and the projection are the same as the Tropical SST Chart (3).

5. The Seasonal SST Anomaly Chart (initiated in September 1979, fig. 5) is a composite analysis of 3 months of data. The climatology used for this chart is the Robinson-Bauer Climatology (1976, 1979). The area of coverage and the projection are the same as the Tropical SST Chart (3).

B. Regional SST Analysis Charts are generated by objective methods on a polar stereographic grid (about 24km at 60°N) using an objective analysis procedure. All but the Northeast Pacific analysis are contoured on polar stereographic charts. These analyses are 5-day composites of SST data from ship reports, fixed and drifting buoys, BTs, and satellite derived SST data. The analysis technique is described by Gemmill and Larson (1979) and Gemmill and Auer (1982).

1. The NW Atlantic (initiated in February 1977, fig. 6) area covers from 25°-45°N and from 55°W to the east coast of the U.S.

2. The Gulf of Mexico (initiated in February 1978, fig. 7) area of coverage is from 15°N northward and from 80°W westward.

3. The Gulf of Alaska SST area of coverage (fig. 8) is from 40°-60°N and from the west coast to 160°W.

4. The Northeast Pacific SST (fig. 9) coverage extends from 20°-60°N and from the coast to 155°W on a mercator projection.

C. Ocean Feature Analyses

1. The Oceanographic Analyses are detailed and subjective, depicting positions of thermal fronts such as the Gulf Stream (G.S.), Loop Current (L.C.), and eddies. See Gemmill and Auer (1982) for details. The analysis is derived from infrared (IR) satellite data. Numbers on the chart represent SST. Arrows on warm and cold eddies indicate direction of circulation. Warm-core or anticyclonic eddies rotate clockwise and cold-core or cyclonic eddies rotate counter-clockwise. Fish tend to school along thermal fronts and the IR sensors aboard the NOAA 7 and 8 satellites are able to differentiate those fronts. Analyses are plotted on a Mercator chart.

a. NW Atlantic Ocean Feature Analysis (fig. 10) is updated on Monday, Wednesday, and Friday. The area of coverage is from 35°-50°N and 45°W to the northeast coast of U.S.

b. NW Atlantic/Gulf of Mexico Ocean Feature Analysis Chart (fig. 11) is updated on Tuesday and Thursday. The area of coverage is from 20°-35°N and from 65°W to the Mexican coast.

D. BATHYTHERMOGRAPH TEMPERATURE ANALYSES - The experimental sea surface and subsurface (100m) thermal analyses (initiated in June 1982) use BT data extracted from the real time Global Telecommunication System (GTS) (See Gerald Office Note 290). The area of interest is the northeast Pacific (20°-60°N and 108°-155°W). This region was chosen because of its importance to fisheries and ocean going vessels. Both analyses are subjectively drawn weekly using a 2-week composite of BT data on a Mercator chart.

1. The BT/SST Analysis (fig. 12) is produced to preserve vertical consistency between the surface and 100m BT analyses. The data are contoured and compared to the National Weather Service 5-day composite objective sea surface temperature analysis, subjective thermal analyses, and the Robinson climatology.

2. The BT 100m Subsurface Temperature Analysis (fig. 13) data are contoured and then compared to the BT/SST analysis, the previous week's 100m subsurface temperature analysis, and the Robinson climatology.

E. NAVY-NOAA JOINT ICE CENTER ANALYSES are composites of pictorial data from Advanced Very High Resolution Radiometer (AVHRR), Global Area Coverage (GAC) Scanning Multifrequency Microwave Radiometer (SMMR), NOAA-7 and 8 mosaics, aerial ice reconnaissance data, shore station reports, ship reports,

and Canadian ice analyses. The charts are produced on a polar azimuthal equidistant grid.

1. The Eastern Arctic Analysis (fig. 14) depicts Arctic ice limits, the innerpack condition, and 7-day ice limit forecasts within the area bounded by 95°E extending westward to 95°W. This chart also depicts ice conditions on the Great Lakes.

2. The Western Arctic Analysis (fig. 15) depicts the 30-day ice limit and ice concentration forecasts within the area bounded by 95°E extending eastward to 95°W.

3. The Antarctic Analysis (fig. 16) depicts Antarctic ice limit boundaries, innerpack conditions, and 7-day ice limit forecasts from 30°S to the coast of Antarctica.

4. Bering Sea - Chukchi Sea Chart (fig. 17) is a weekly composite analysis depicting ice conditions in the Bering, Chukchi, and Beaufort Seas. The analyzed parameters are the ice edge, the ice concentration, openings and leads in the ice, and an estimation of ice age and thickness.

5. The Great Lakes Ice and Surface Water Temperature Analysis (fig. 18) is a quantitative, computerized surface temperature analysis of the five Great Lakes. The analysis is produced from AVHRR visual digital data. It depicts surface temperature contours at 1-2°C intervals for each of the Great Lakes. When ice is present it is analyzed in the same manner as the high latitude products. The Great Lakes analyses are contoured on a Mercator grid.

F. The Oceanographic Monthly Summary is published jointly by the NWS and the NESDIS. The Oceanographic Monthly Summmary contains SST analyses

on both regional and ocean basin scales for the Atlantic and Pacific Oceans. Two ocean basin SST analyses are presented, one based on in-situ data from ship weather reports, buoys, and BT reports and another based solely on satellite data. An ocean basin SST anomaly derived from the in-situ data is also included (See Reynolds (1982) for details). The regional SST analyses are based on a combination of in-situ and satellite data measurements. The regional SST anomalies use the Robinson-Bauer Climatology. The Oceanographic Monthly Summary also contains Alaskan sea ice information and ocean feature information for contiguous U.S. ocean regions. All the analyses are produced on mercator projections except the Bering Sea/North Slope Ice Analysis. It is produced on an azimuthal equidistant projection. The Pacific SST monthly mean and anomaly analyses are shown as Eastern and Western Pacific Ocean panels. The OMS contains the following information.

1. Oceanotes is an article containing news of interest to OMS readers, such as the introduction of a NW analysis.
2. Pacific Ocean SST Monthly Mean contains ship, BT, and buoy data. Fig. 19 is an example of the Eastern Pacific Ocean chart. The Western Pacific Ocean chart area coverage is from 30°S-70°N and 170°W-100°E.
3. Pacific Ocean SST Monthly Anomaly. Fig. 20 represents an Eastern Pacific Ocean analysis.

   The Western Pacific Ocean area of coverage is the same as (2) above.
4. Pacific Ocean SST Monthly Mean contains only satellite data. Fig. 21 is an Eastern Pacific Ocean analysis. The Western Pacific Ocean chart area of coverage is the same as (2) above.
5. Atlantic Ocean SST Monthly Mean contains ship and buoy data (fig 22).

6. Atlantic Ocean SST Monthly Anomaly (fig. 23).

7. Atlantic Ocean SST Monthly Mean contains only satellite data (fig. 24).

8. Satellite Image of the Month depicts the best satellite image collected by NESDIS each month in terms of oceanographic interest.

9. Bering Sea/North Slope Ice Chart, with text (fig. 25).

10. West Coast Ocean Features, with text (fig. 26).

11. West Coast SST Monthly Mean (fig. 27).

12. West Coast SST Monthly Anomaly (fig. 28).

13. East Coast Ocean Features, with text (fig. 29).

14. Gulf of Mexico SST Monthly Mean (fig. 30).

15. NW Atlantic Ocean SST Monthly Mean (fig. 31).

16. Gulf of Mexico SST Monthly Anomaly (fig. 32).

17. NW Atlantic Ocean SST Monthly Anomaly (fig. 33).

18. Subscription Information - Subscription orders for the Oceanographic Monthly Summary should be placed with:

    Superintendent of Documents
    U. S. Government Printing Office
    Washington, DC 20402

    Subscription rates are:

    Annual---------Domestic $16.00
                   Foreign $20.00

    Single copy----Domestic $ 2.25
                   Foreign $ 2.85

    Checks should be made payable to Superintendent of Documents. Air mail delivery can be obtained (at additional cost) by request.

G. OCEAN WAVE MOVEMENTS. Wave data are measured by various buoys operated by the NOAA Data Buoy Center (NDBC) and the National Ocean Service (NOS). These data are processed by the NMC into Spectral Wave data bulletins. The data are then transmitted from NMC via AFOS regional circuits every three hours in tabular form (p. 53). Wave data bulletins are sent on a limited number of teletype circuits as well. An onsite application program resident in AFOS converts the data (fig. 34) from bulletin form to a graphic format.

TABLE OF DISSEMINATION

RADIO FAX (CARIBBEAN)
FREQUENCIES 9290.0 KHZ
9389.5KHZ 11035.0KHZ

*MAIL
**MAIL ONLY
***AUTOMATIC TELECOPIER

CHARTS		ALASKA FAX					DIFAX					HONOLULU					NAFAX					NMFAX					OFFUT									
	*	TRAN DAY	SIZE %	TIME (Z)	SLOT #	TRAN #	TRAN DAY	SIZE %	TIME (Z)	SLOT #	TRAN #	TRAN DAY	SIZE %	TIME (Z)	SLOT #	TRAN #	TRAN DAY	SIZE %	TIME (Z)	SLOT #	TRAN #	TRAN DAY	SIZE %	TIME (Z)	SLOT #	TRAN #	TRAN DAY	SIZE %	TIME (Z)	SLOT #	TRAN #	TRAN DAY	SIZE %	TIME (Z)	SLOT #	TRAN #
Northern Hemisphere SST	*	Tue	62	1640	AD56	586	Tue	100	1621	D283	586	Tue	100	1536	H58	586																Mon Tue Thur-Sun	100	1213	3618A	592
Southern Hemisphere SST	**																															Wed	100	1213	3618A	592
Tropical SST	*	Mon Thur	100	1640	AD56	586	Mon Thur	100	1621	D283	586	Mon Thur	100	1536	H58	586																				
Semi-Monthly Anomaly	*																																			
Seasonal SST Anomaly																																				
NW Atlantic SST	*																																			
Gulf of Mexico SST	*																																			
Gulf of Alaska SST	*	Sun	100	1640	AD56	586	Sun	100	1621	D283	586	Sun	100	1536	H58	586	Sun	100	2157	N78	587															
Northeast--Pacific SST	*	Wed Sat	62	1640	AD56	586	Wed Sat	62	1621	D283	586	Wed Sat	100	1536	H58	586																				
Oceanographic Analysis	***																																			
a.) NW Atlantic							Mon Wed Fri	100	2156	D127	587						Mon Wed Fri	100	2159	N98	587															
b.) NW Atlantic/Gulf of Mexico							Tue Thur	100	2156	D127	587						Tue Thur	100	2159	N98	587															
Experimental BT SST Analysis	**																																			
Experimental BT 100m Temperature Analysis	*	Sat	62	0136	K291	595	Fri	62	2353	046	595						Sat	62	0116	N6	595															
Eastern Arctic																											Wed	100	1919	AF 329	591					
Western Arctic		Daily	62	2150	MA 289	593																														
Antarctica																											Fri	95	1945	AF 330	596					
Bering Sea-Chukchi Sea		Mon Wed Fri	100	2140	MK 288	544	Thur Sun	100	1241	D-137	452						Thur Sun	100	1119	N-61	452	Thur Sun	100	1305	MA 113N	452	Thur Sun	100	1220	D-137	452					
Great Lakes Ice & Water Temperature Analysis							Wed Sat	100	1241	D-137	452						Wed Sat	100	1119	N-61	452	Wed Sat	100	1305	MA 113N	452	Wed Sat	100	1220	D-137	452					

NOTE: Only Individuals with Facsimile Equipment are able to get these Charts when Transmitted.

*TRAN: TRANSMISSION

AVAILABILITY AND OPERATION OF AUTOMATIC TELECOPIER

Oceanographic analyses are available on automatic telecopier at the following telephone numbers: 301-899-1139 commerical or 202-899-1139 FTS and 301-763-8333 commercial or 763-8333 FTS during specified time periods.

The Weekly schedule of times and the charts to be transmitted on the telecopier number 301-899-1139 or 202-899-1139 are the following:

Monday	Tuesday	Wednesday	Thursday	Friday
1:00-4:00pm	1:00-4:00pm	1:00-4:00pm	1:00-4:00pm	1:00-4:00
Previous Friday's expanded Northwest Atlantic Chart	Monday's expanded Northwest Atlantic Chart	No chart. Reserved for future products	Wednesday's expanded Northwest Atlantic Chart	No chart. Reserved for future products
4pm-8:30am	4pm-8:30am	4pm-8:30am	4pm-8:30am	4pm-8:30am
Enlarged Expanded Northwest Atlantic Chart (67°-76°W)	Enlarged Expanded Northwest Atlantic Chart (60°-67°W)	Enlarged Expanded Northwest Atlantic Chart (67°-76°W)	Enlarged Expanded Northwest Atlantic Chart (60°-67°W)	Enlarged Expanded Northwest Atlantic Chart (67°-76°W)

The weekly schedule of times and the charts to be tranmitted on the telecopier number 301-763-8333 are the following:

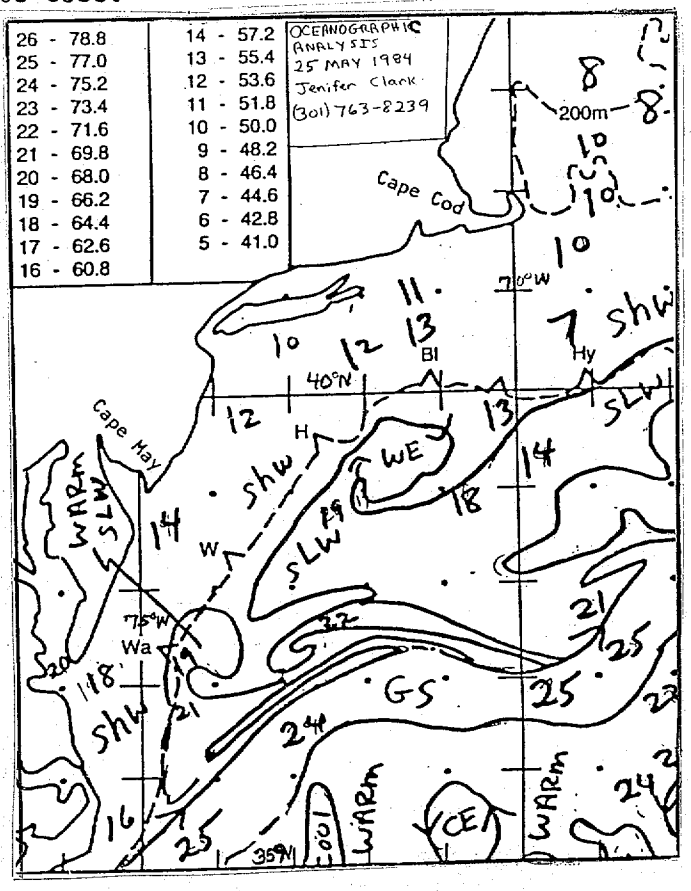
Monday	Tuesday	Wednesday	Thursday	Friday
9:30-11:30am	9:30-11:30am	9:30-11:30am	9:30-11:30am	9:30-11:30am
Previous Friday's expanded Northwest Atlantic Chart	Monday's expanded Northwest Atlantic Chart	Tuedsay's expanded Southwest Atlantic Chart	Wednesday's expanded Northwest Atlantic Chart	Thurday's expanded Southwest Atlantic Chart
5-7pm	5-7pm	5-7pm	5-7pm	5-7pm
Northwest Atlantic Chart	Southwest Atlantic & Gulf of Mexico Chart	Northwest Atlantic Chart	Southwest Atlantic & Gulf of Mexico Chart	Northwest Atlantic Chart

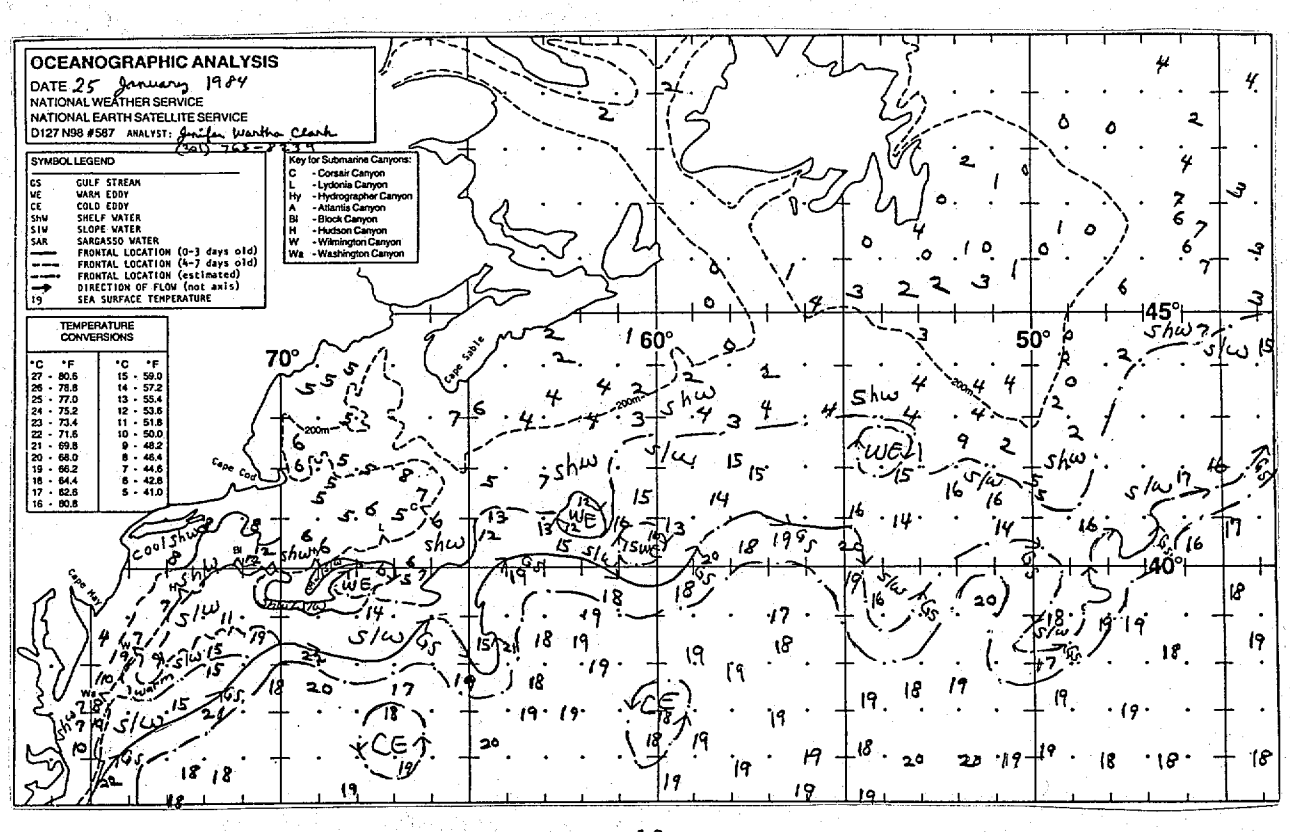
If you are not familiar with automatic telecopy procedures, you can obtain the charts by doing the following:

(1) Set your telecopy machine on 6 minutes, not 4 minutes.
(2) Set your telecopy machine on receive, not send.
(3) Dial 301-899-1139 or 301-763-8333 (commercial) & 202-899-1139 or 301-763-8333 (FTS).
(4) When the tone sounds, place your telephone receiver into the machine.
(5) If our number is busy, keep calling.
(6) If you have any questions about the Oceanographic Analysis contact Jenifer Wartha-Clark at 301-763-8239.
(7) If you have questions regarding the Sea Surface Thermal Analysis contact Reggie Lawrence at 301-763-8444.

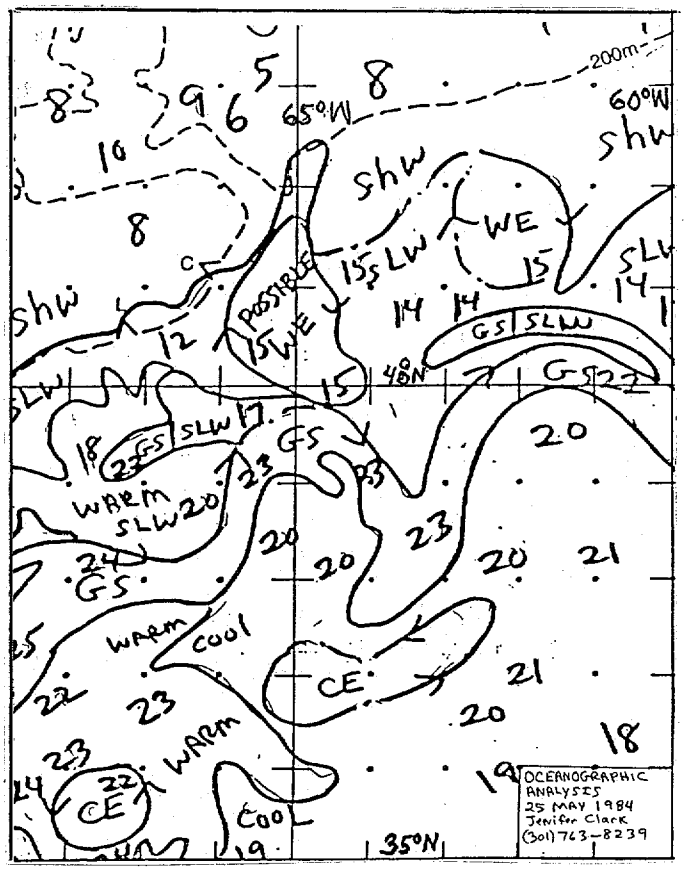
If you have any comments, requests, or suggestions please contact Jenifer Wartha-Clark at 301-763-8239 or Ann Bell at 301-763-8133.

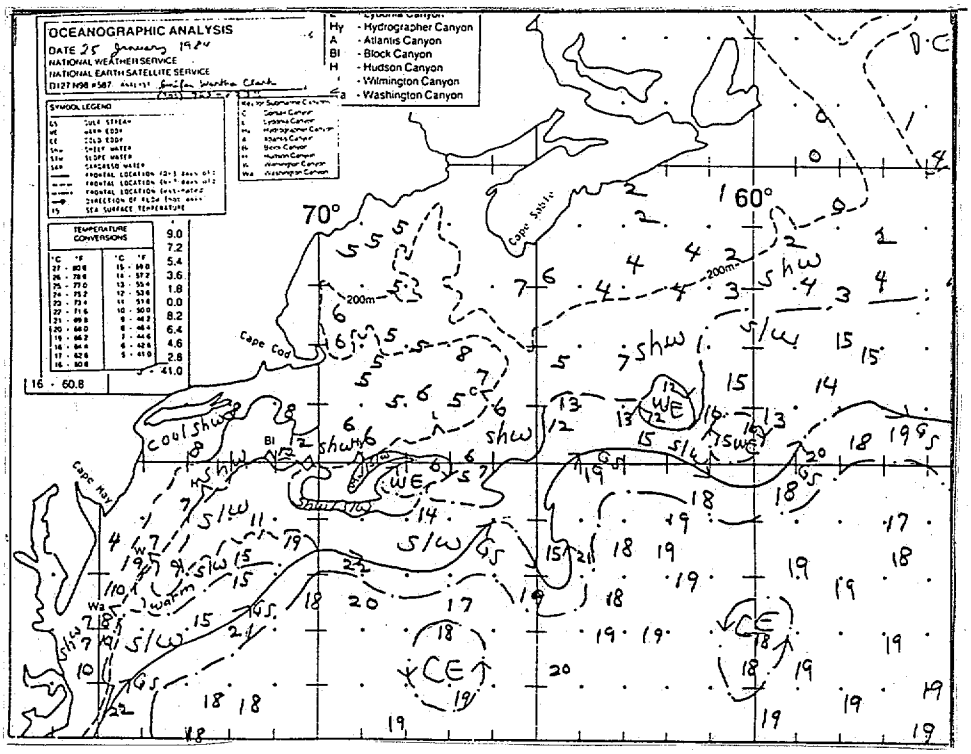
Enclosure 1. Examples of charts telecopied on Monday's, Wednesday's, & Friday's 4pm-8:30am local time at 301-899-1139 or 202-899-1139. The second chart is telecopied the same days 5-7pm local time at 301-763-8333.



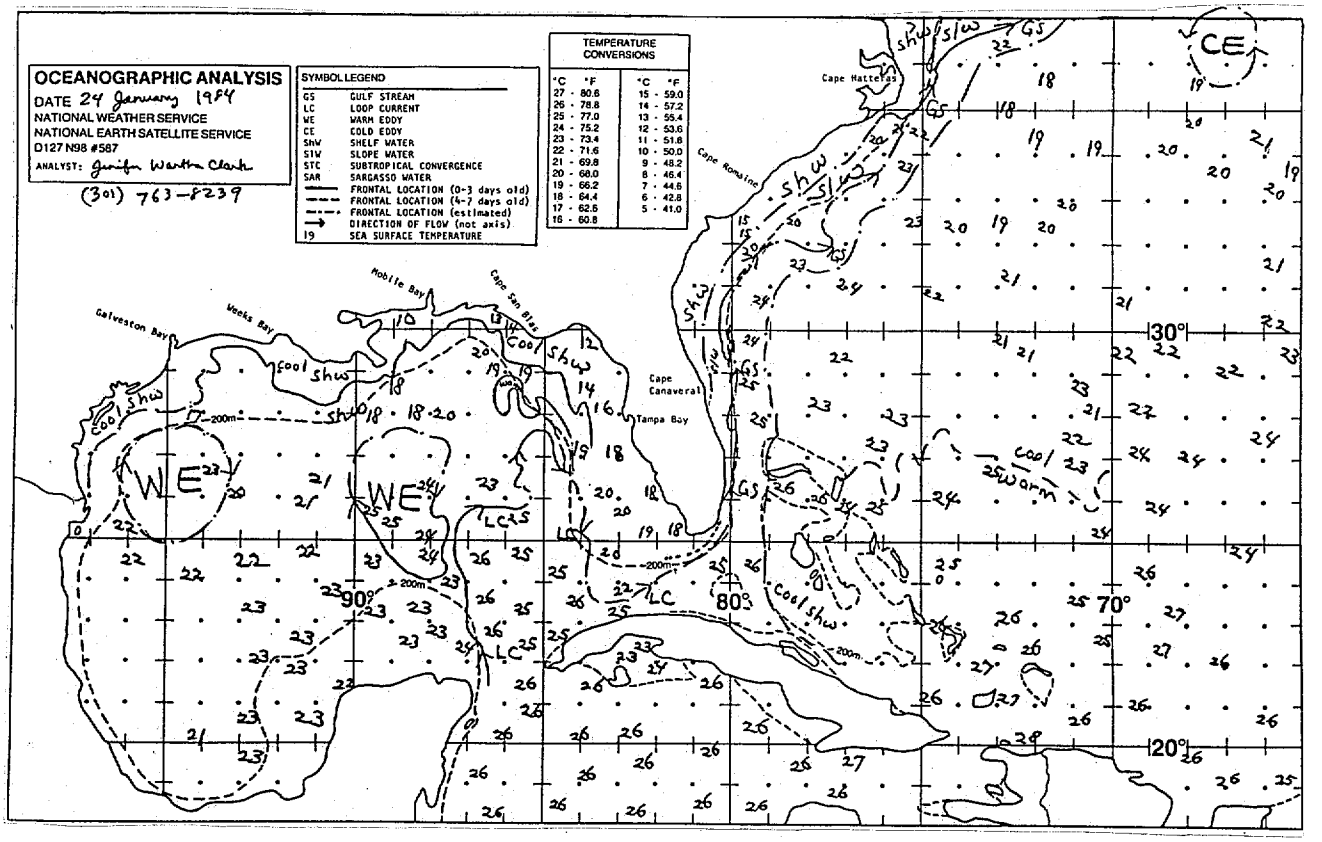


Enclosure 2. Example of expanded chart telecopied on Monday's, Tuesday's, & Thursday's 1-4pm local time at 301-899-1139 or 202-899-1139. The second chart is telecopied the same days 9:30-11:30am local time at 301-763-8333.

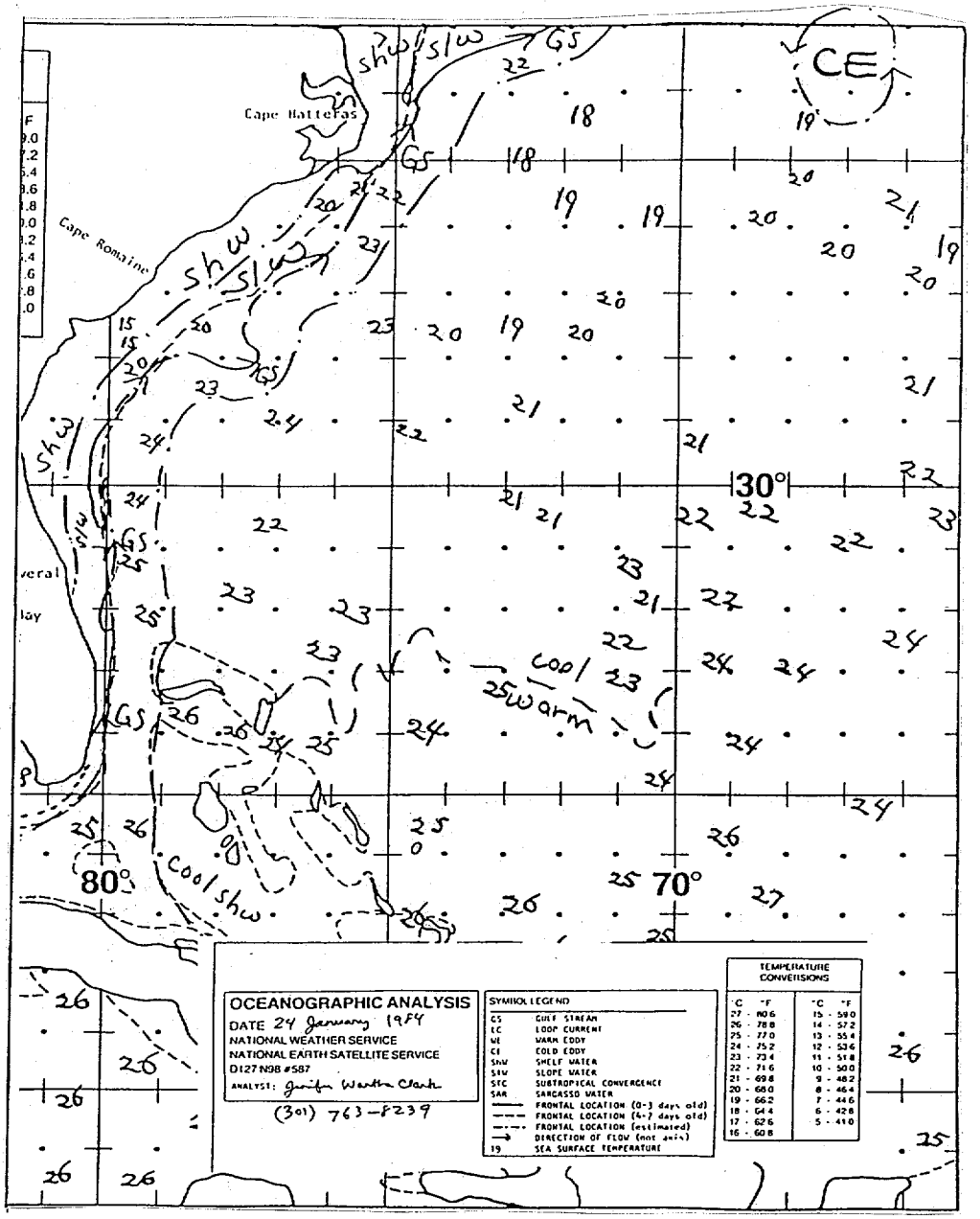


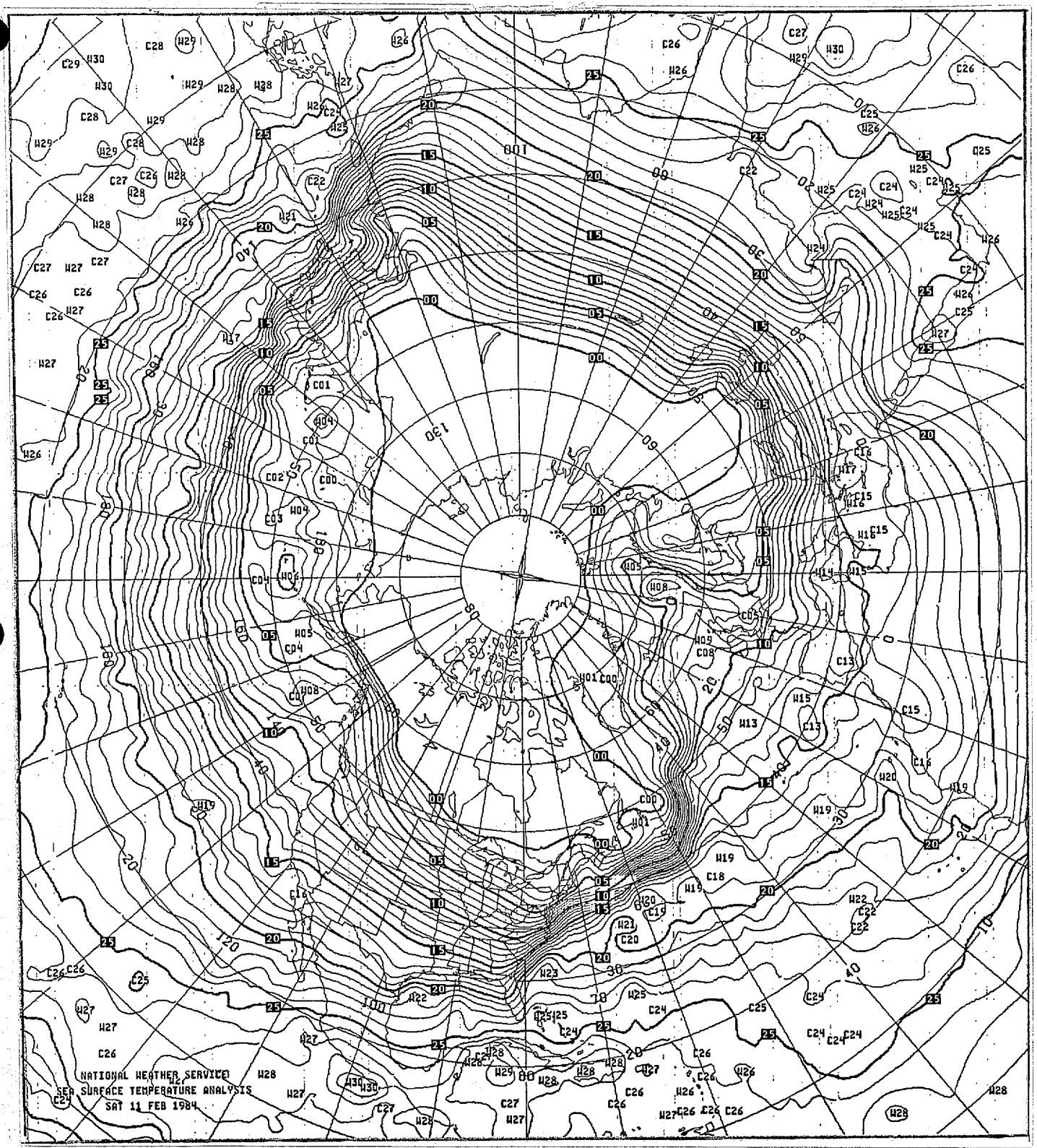


Enclosure 3. Example of chart telecopied on Tuesday's and Thurday's 5-7pm local time at 301-763-8333.



Enclosure 4. Example of expanded chart telecopied on Wednesday's and Friday's 9:30-11:30am local time at 301-763-8333.





GLOBAL SST CHARTS

Figure 1. Northern Hemisphere SST Chart

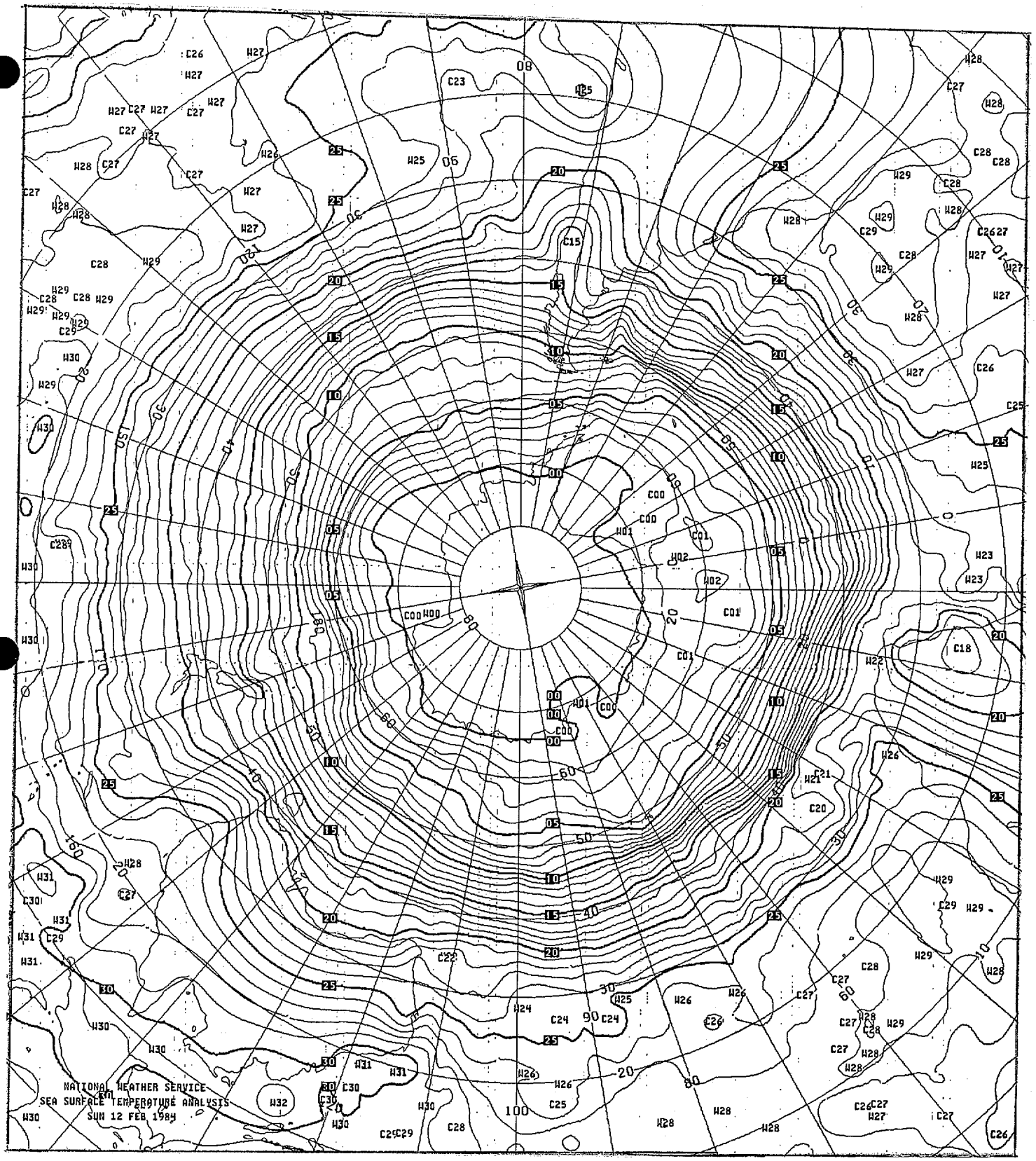


Figure 2. Southern Hemisphere SST Chart

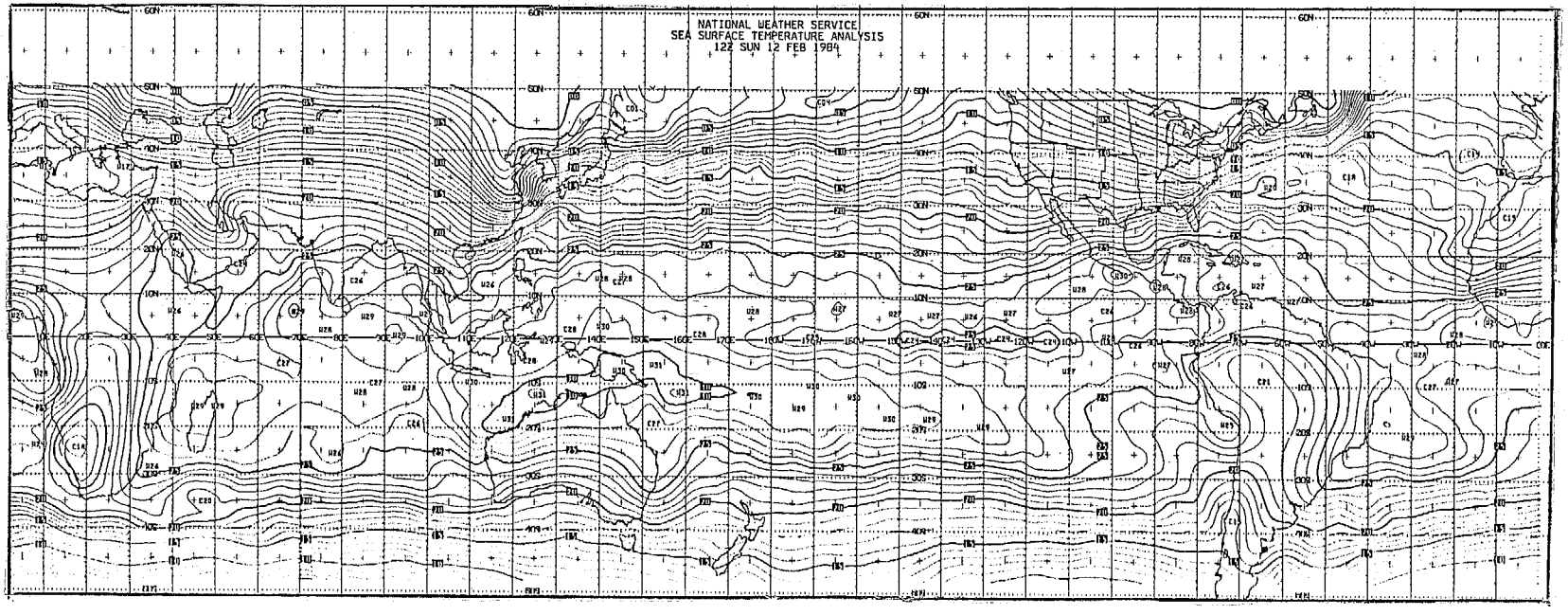


Figure 3. Tropical SST Chart

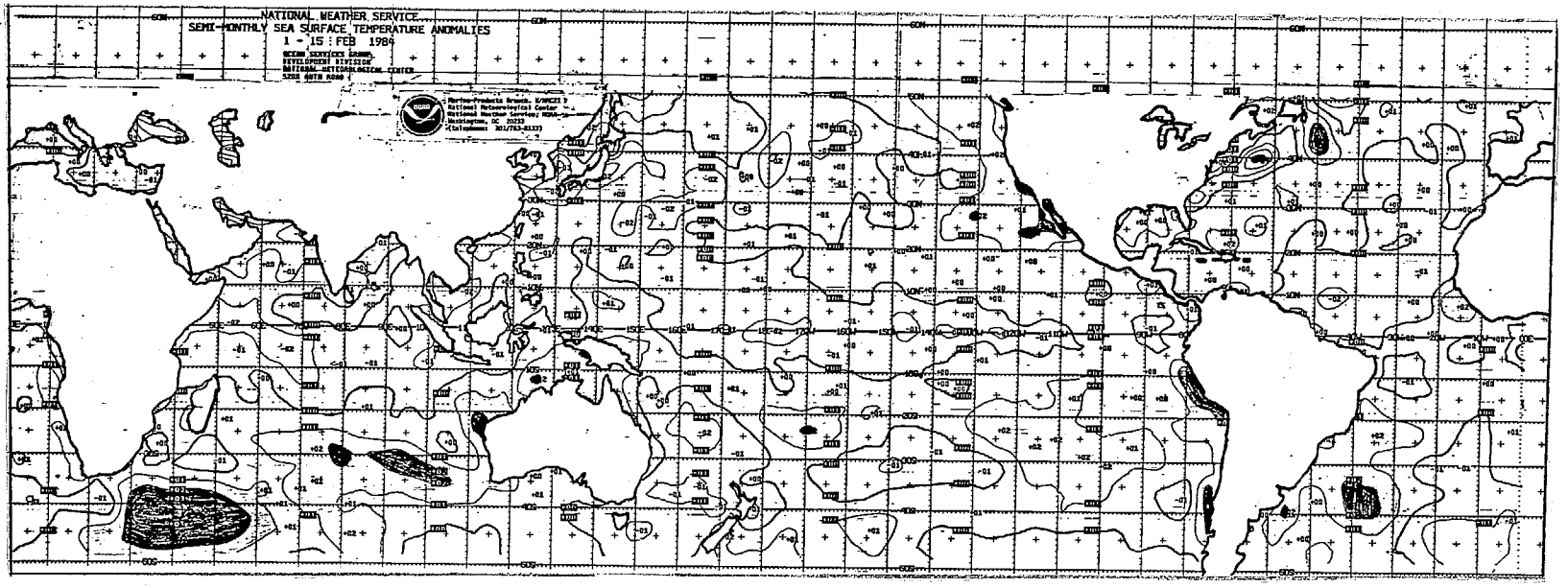


Figure 4. Semi-Monthly Anomaly SST Chart

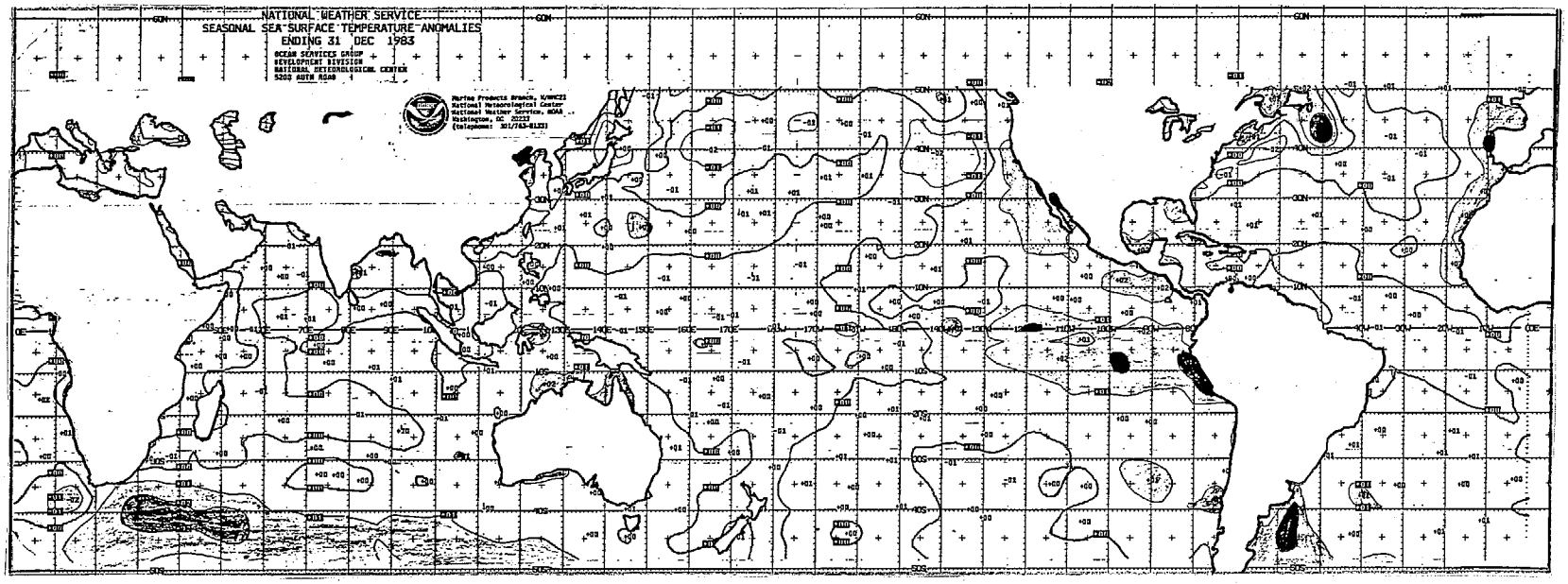
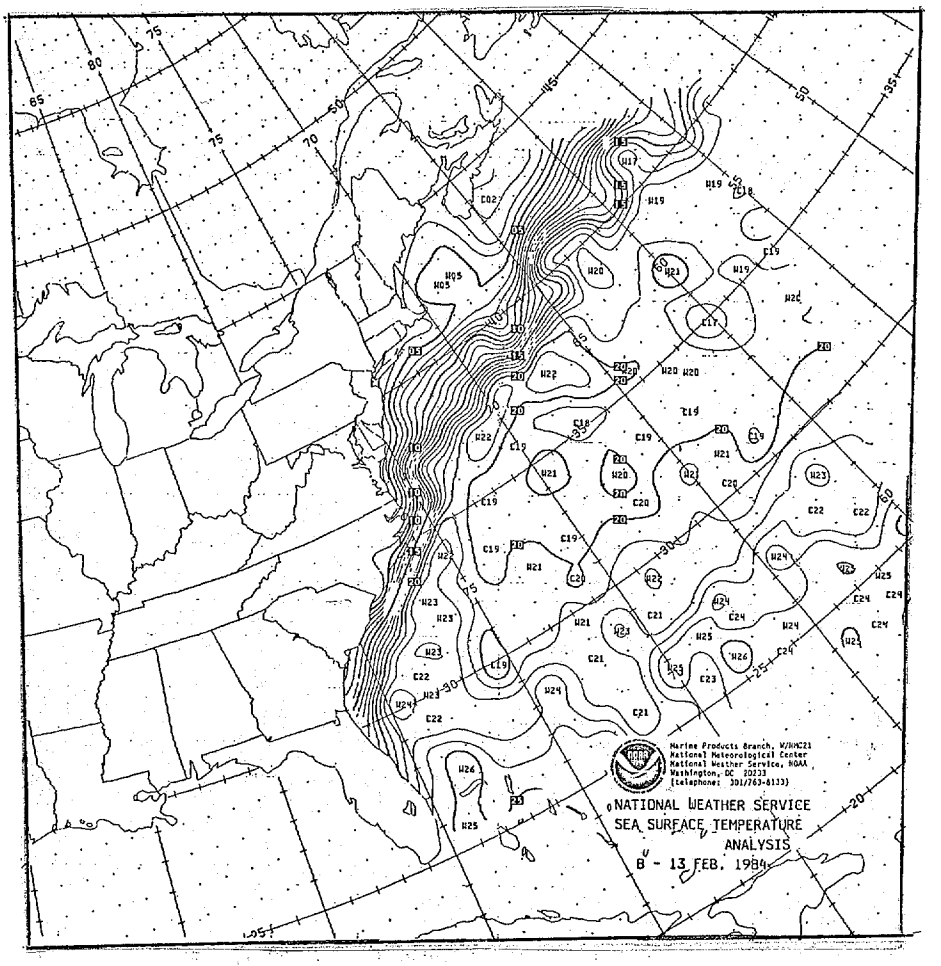


Figure 5. Seasonal Anomaly SST Chart



REGIONAL SST CHARTS

Figure 6. NW Atlantic SST Chart

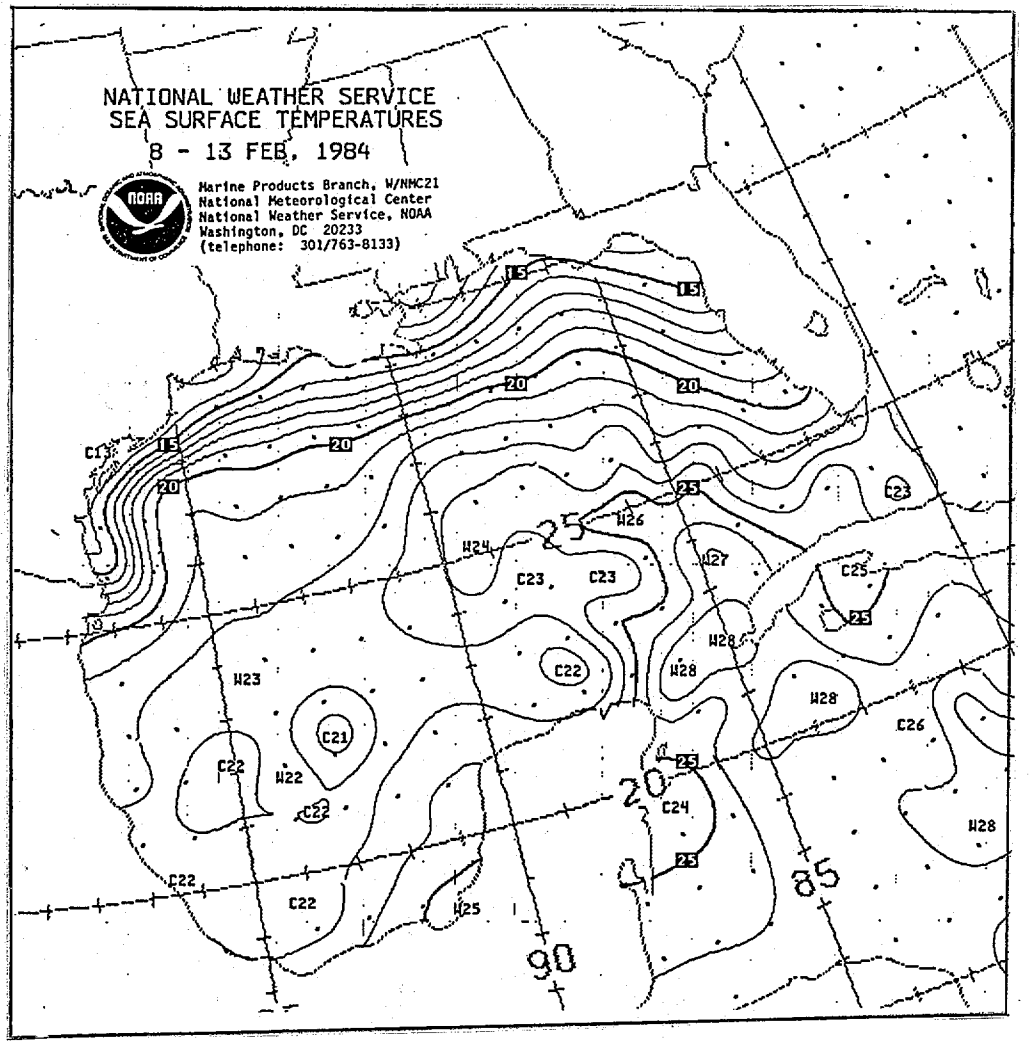


Figure 7. Gulf of Mexico SST Chart

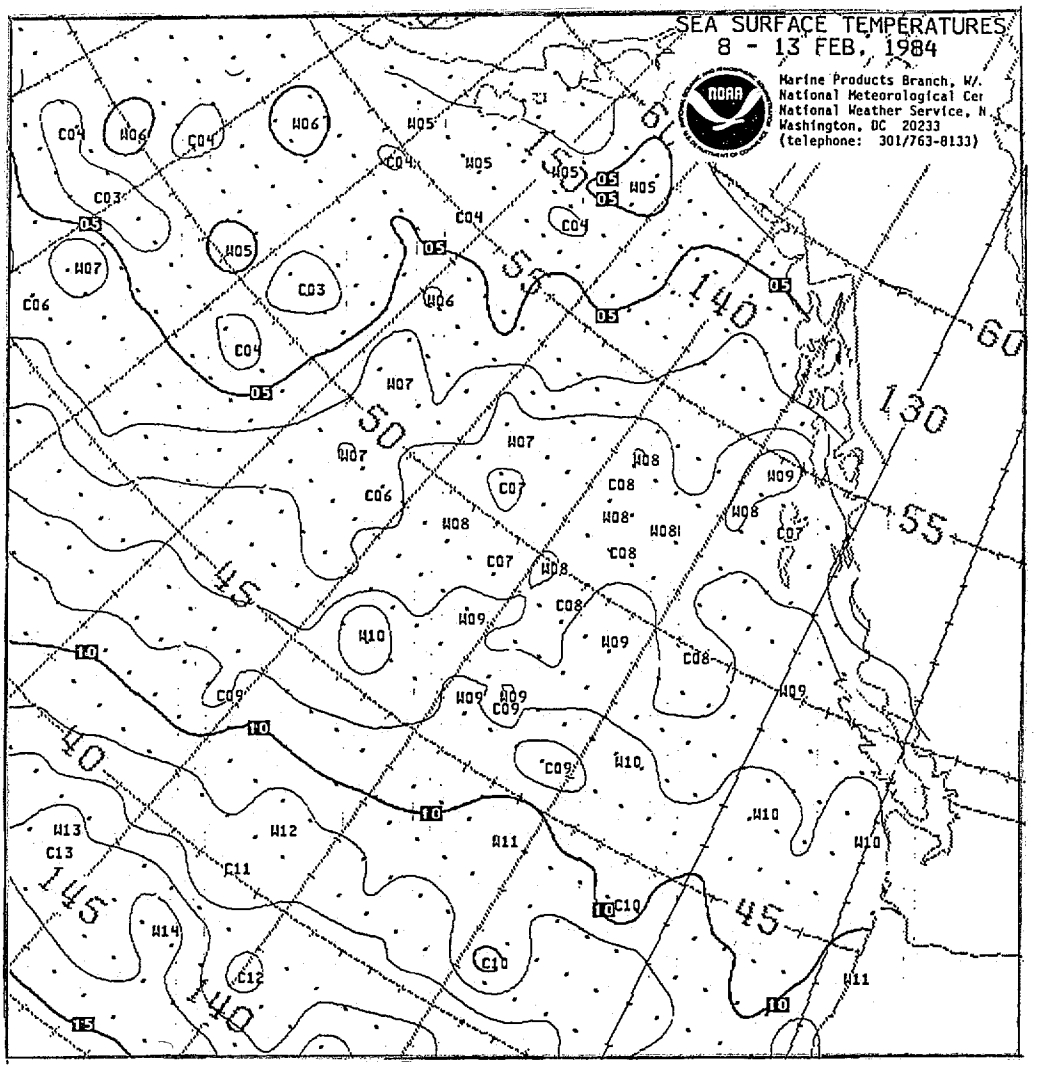


Figure 8. Gulf of Alaska SST Chart

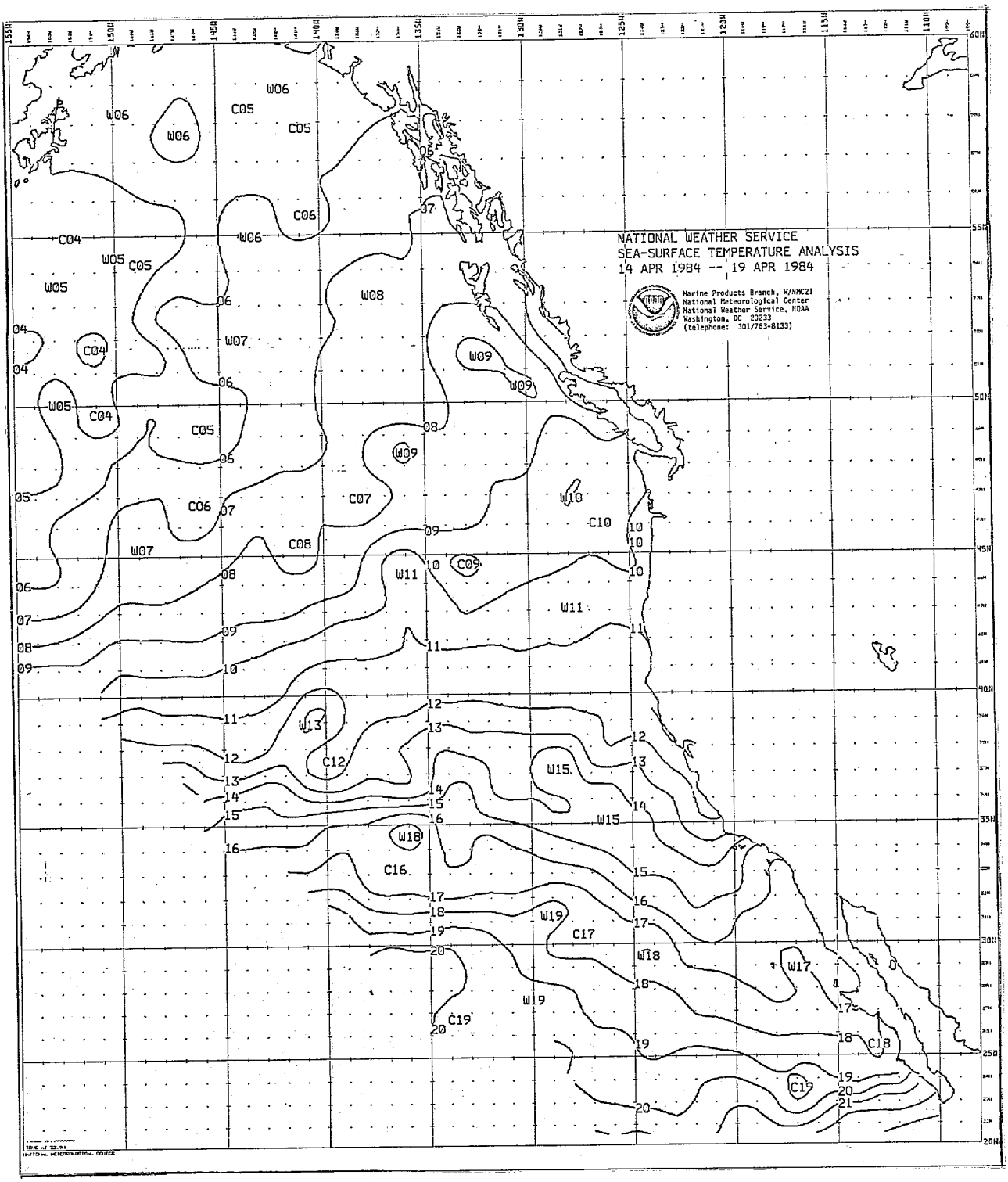
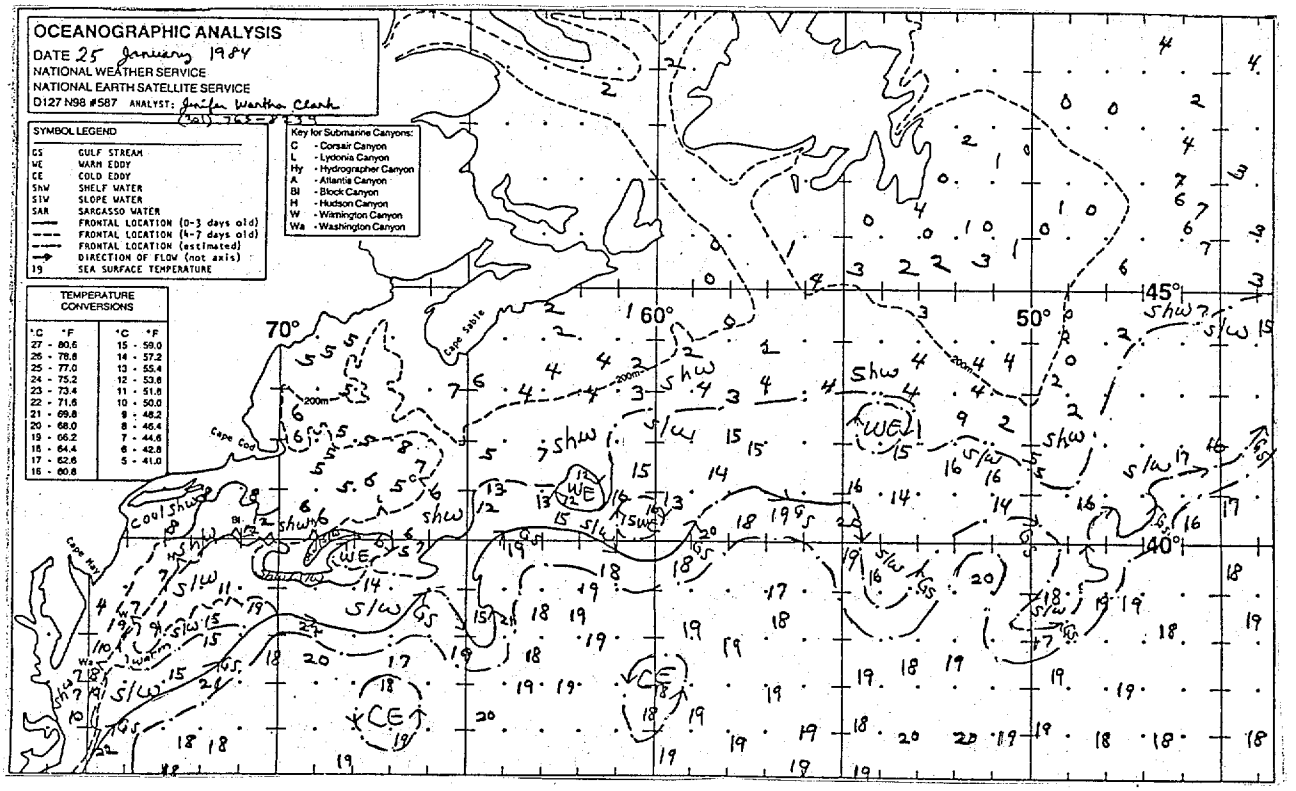


Figure 9. Northeast Pacific SST Chart



OCEAN FEATURE CHARTS

Figure 10. NW Atlantic SST Chart (Northeast U.S. Coast)

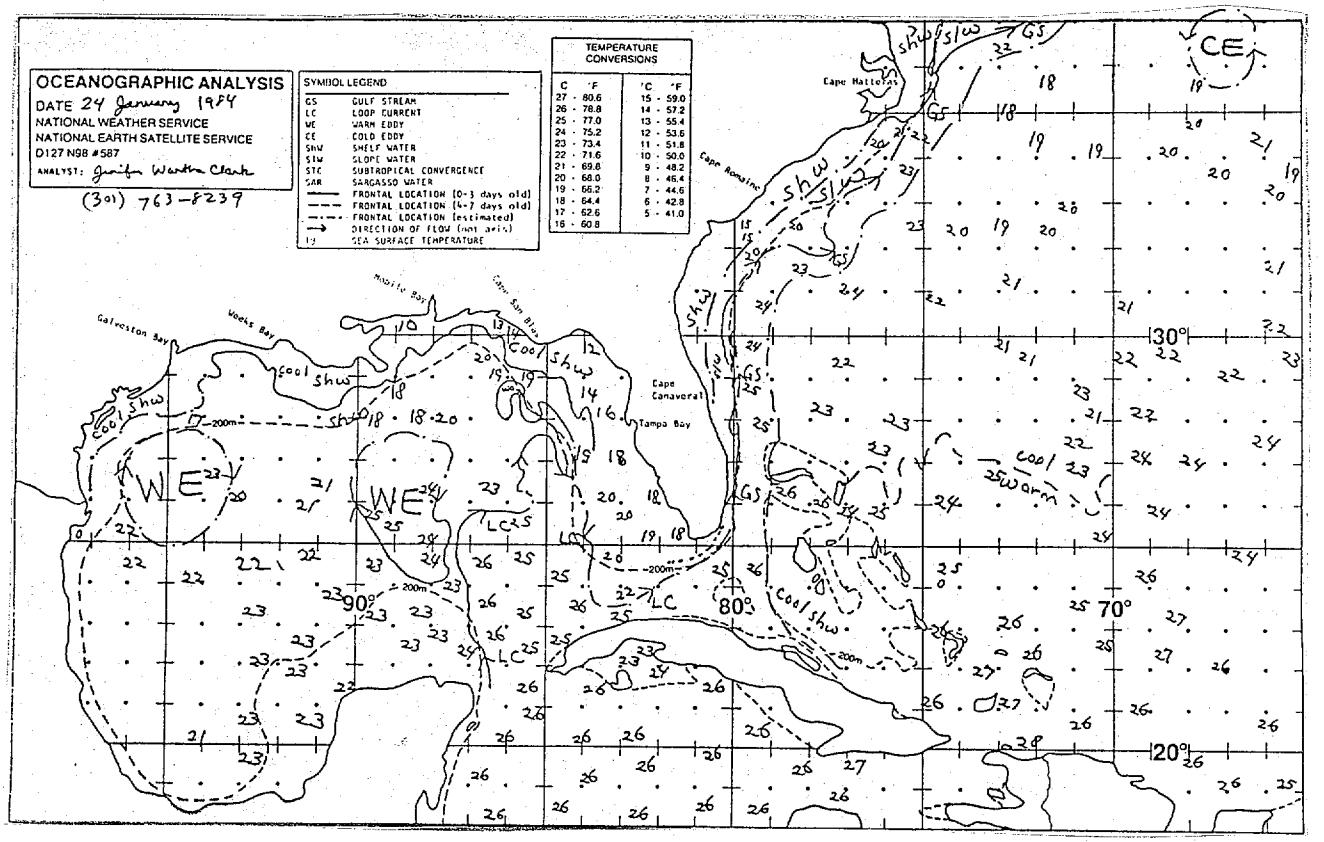
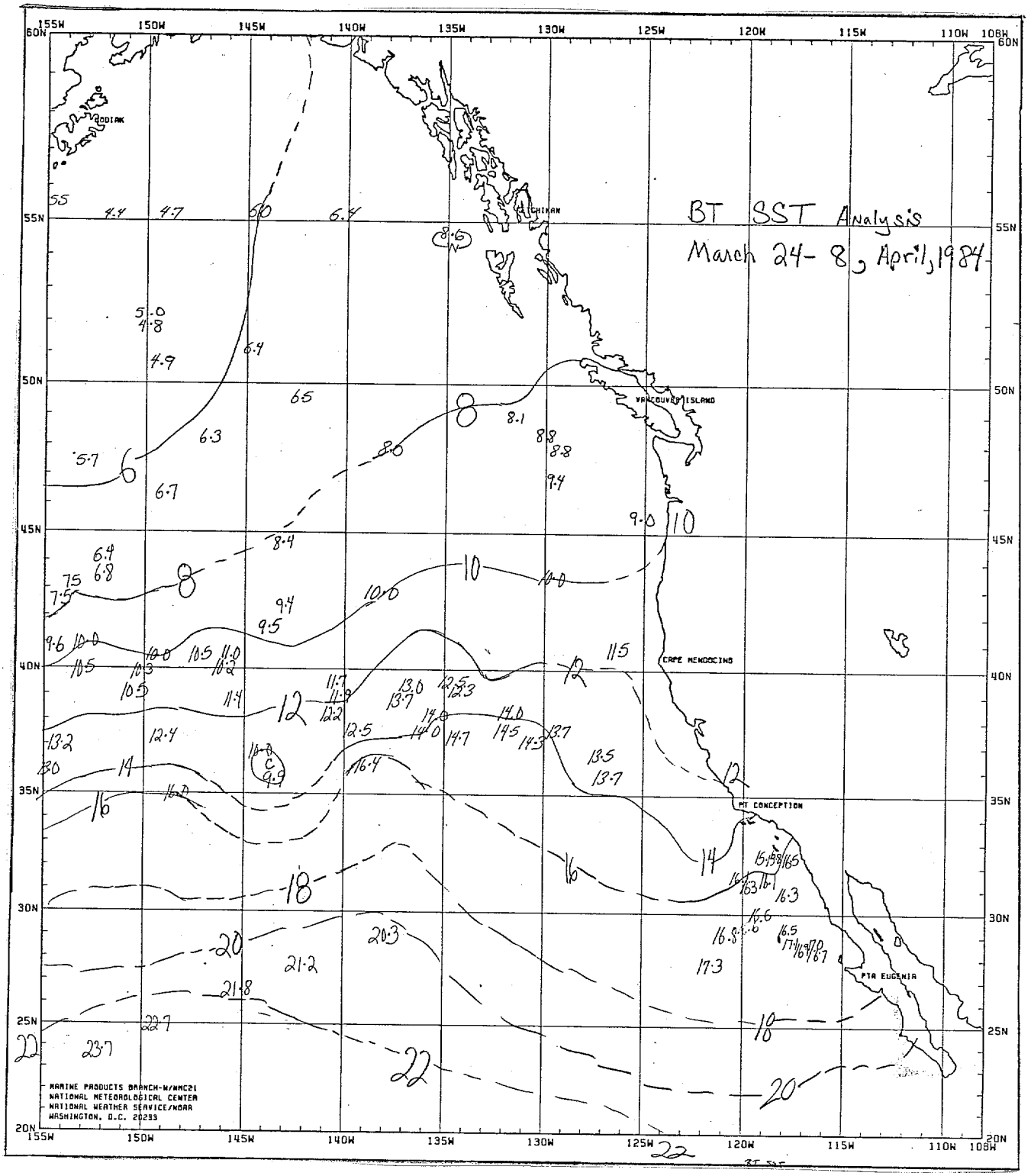


Figure 11. NW Atlantic/Gulf of Mexico SST Chart (Southeast and South U.S. Coast)



BATHYTHERMOGRAPH TEMPERATURE CHARTS

Figure 12. Experimental BT SST Analysis

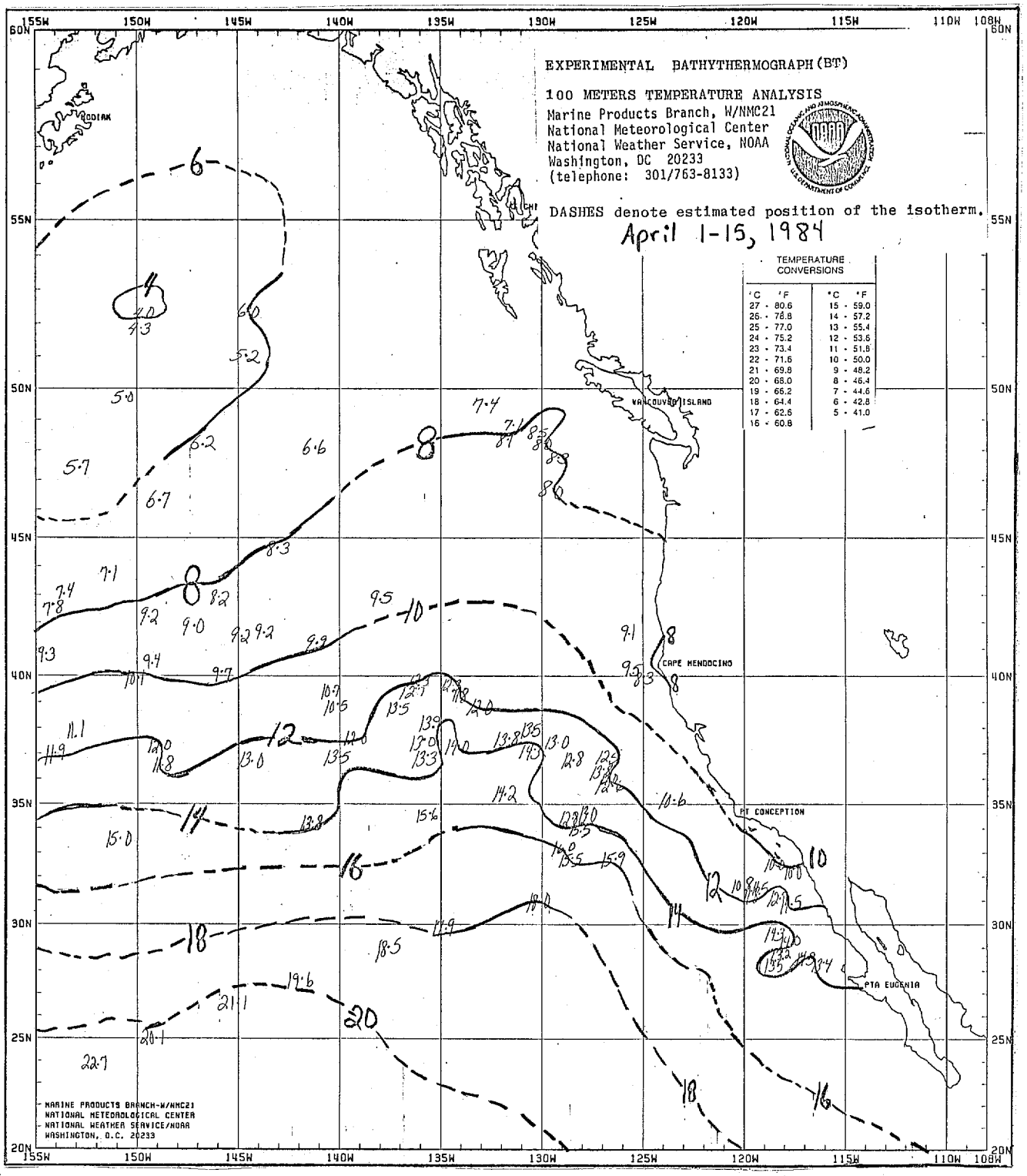
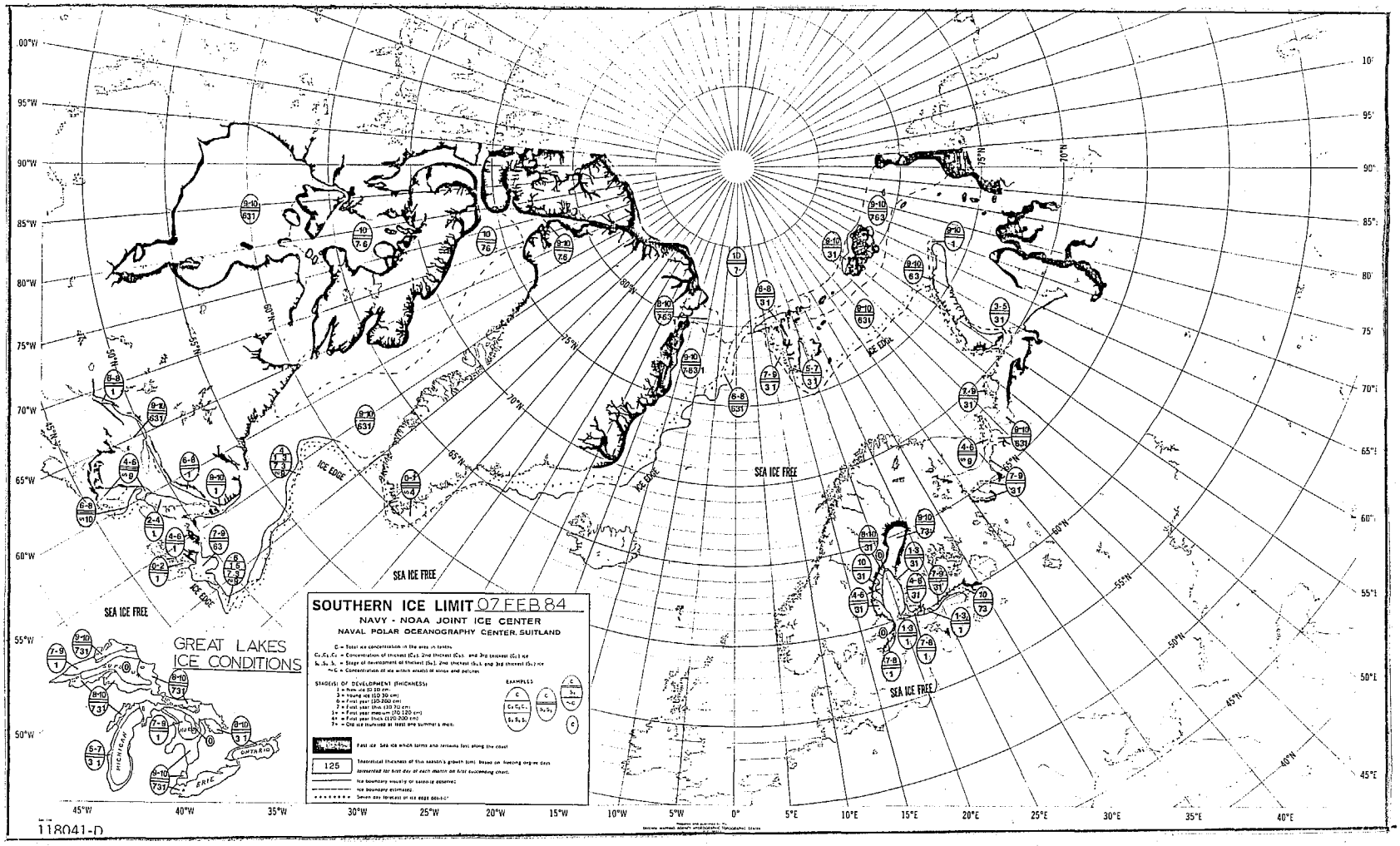


Figure 13. Experimental BT 100m Temperature Analysis



NAVY-NOAA JOINT ICE CENTER CHARTS

Figure 14. Eastern Arctic Chart

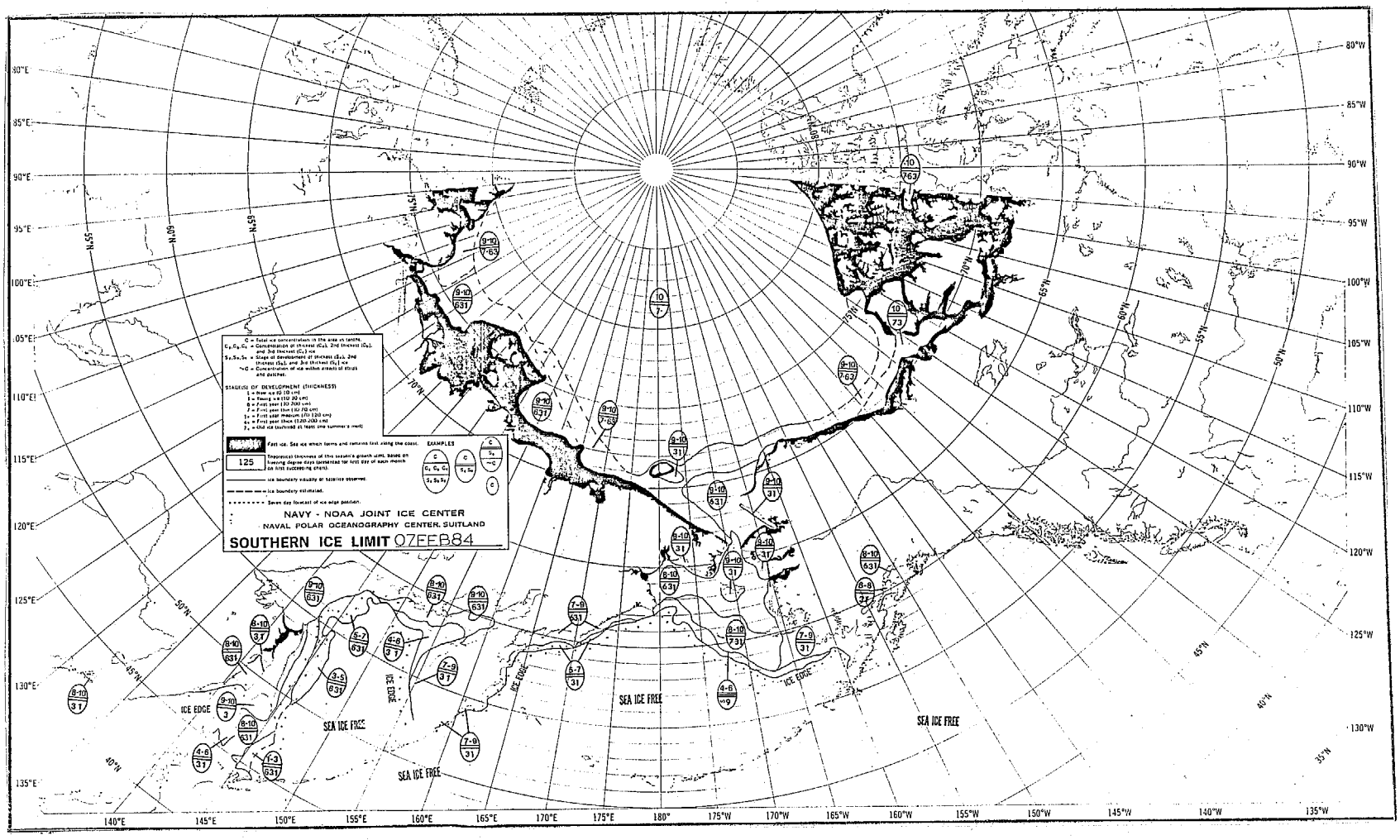


Figure 15. Western Arctic Chart

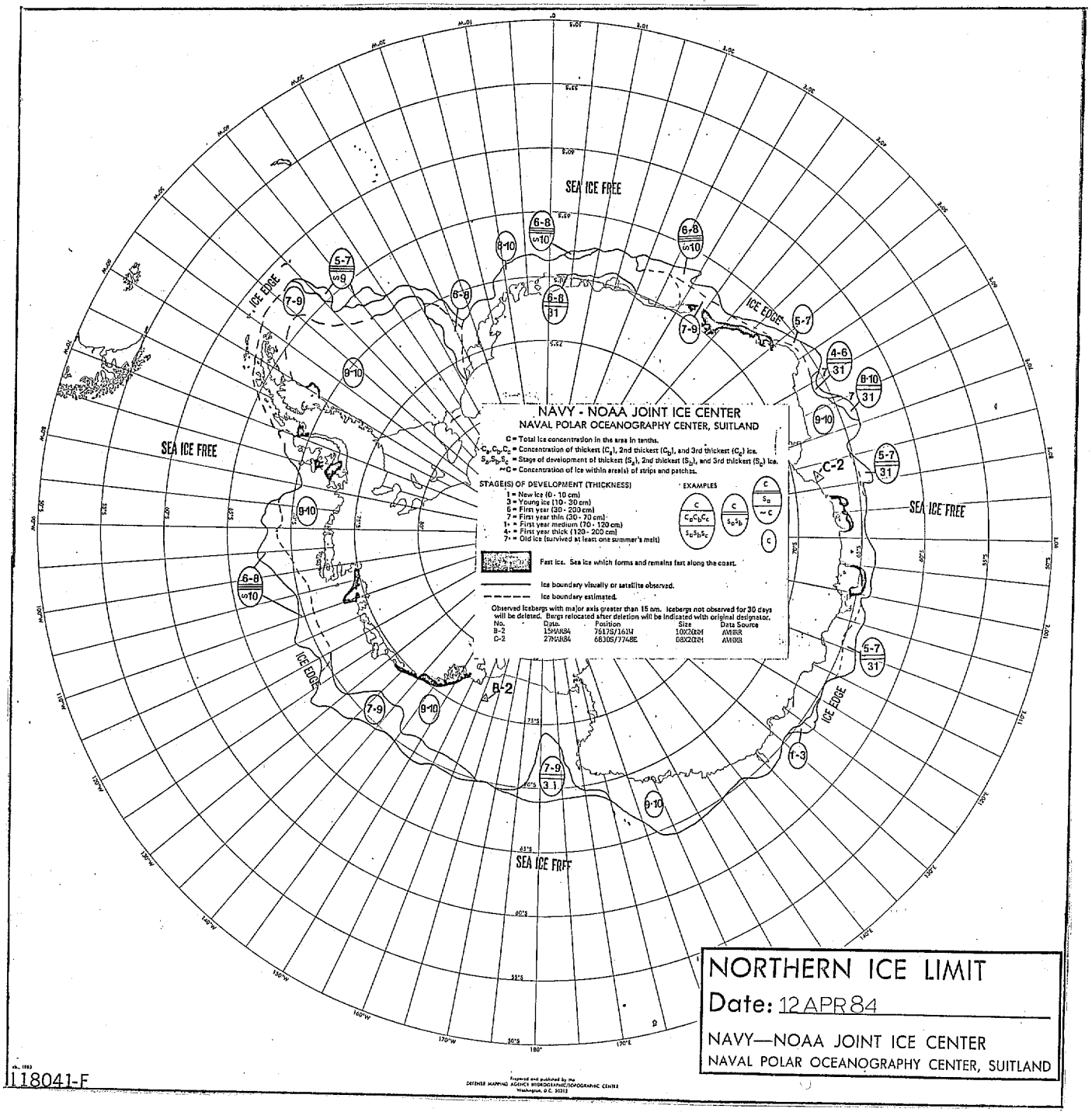


Figure 16. Antarctica Chart

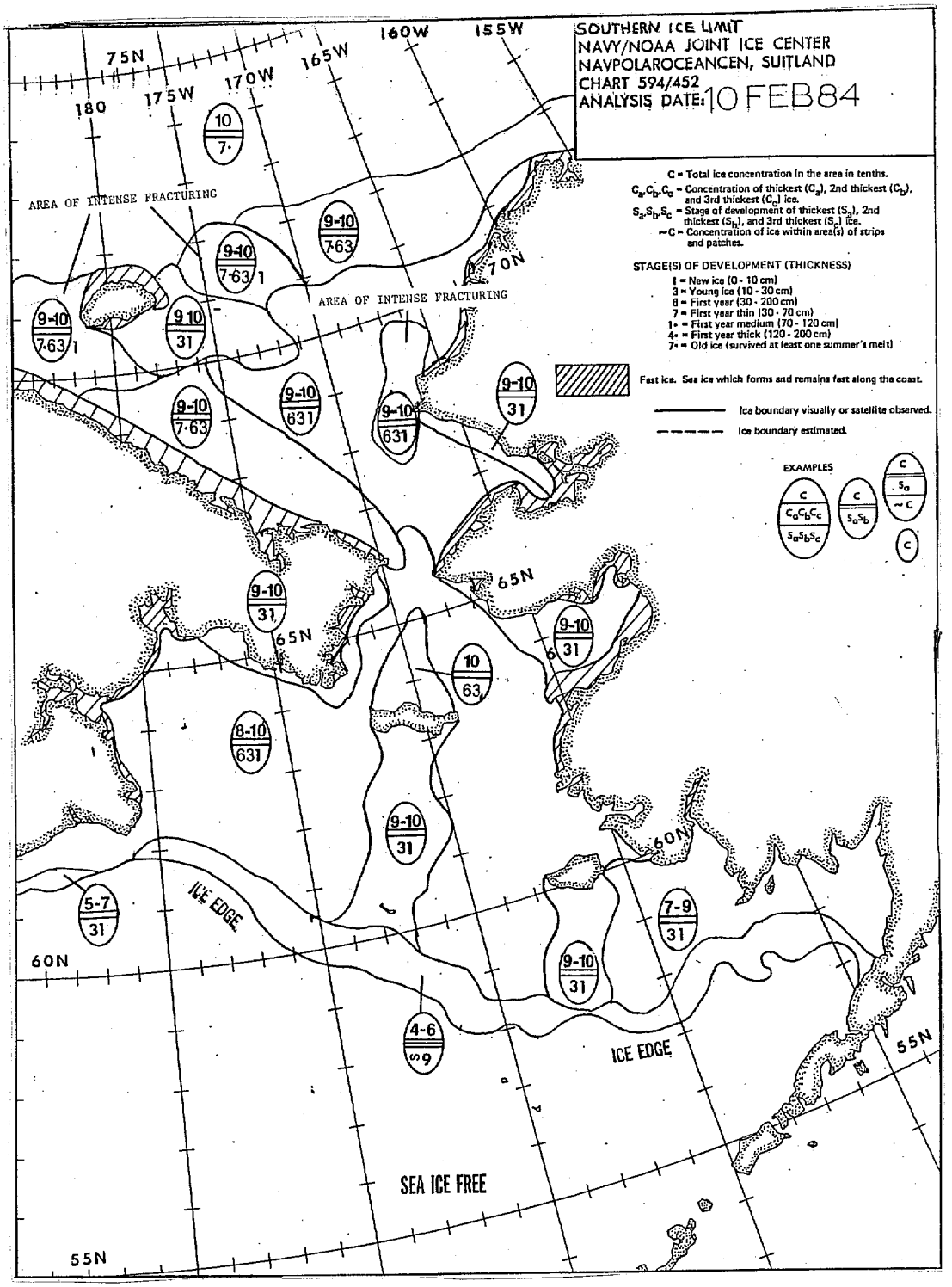


Figure 17. Bering Sea - Chukchi Sea Chart

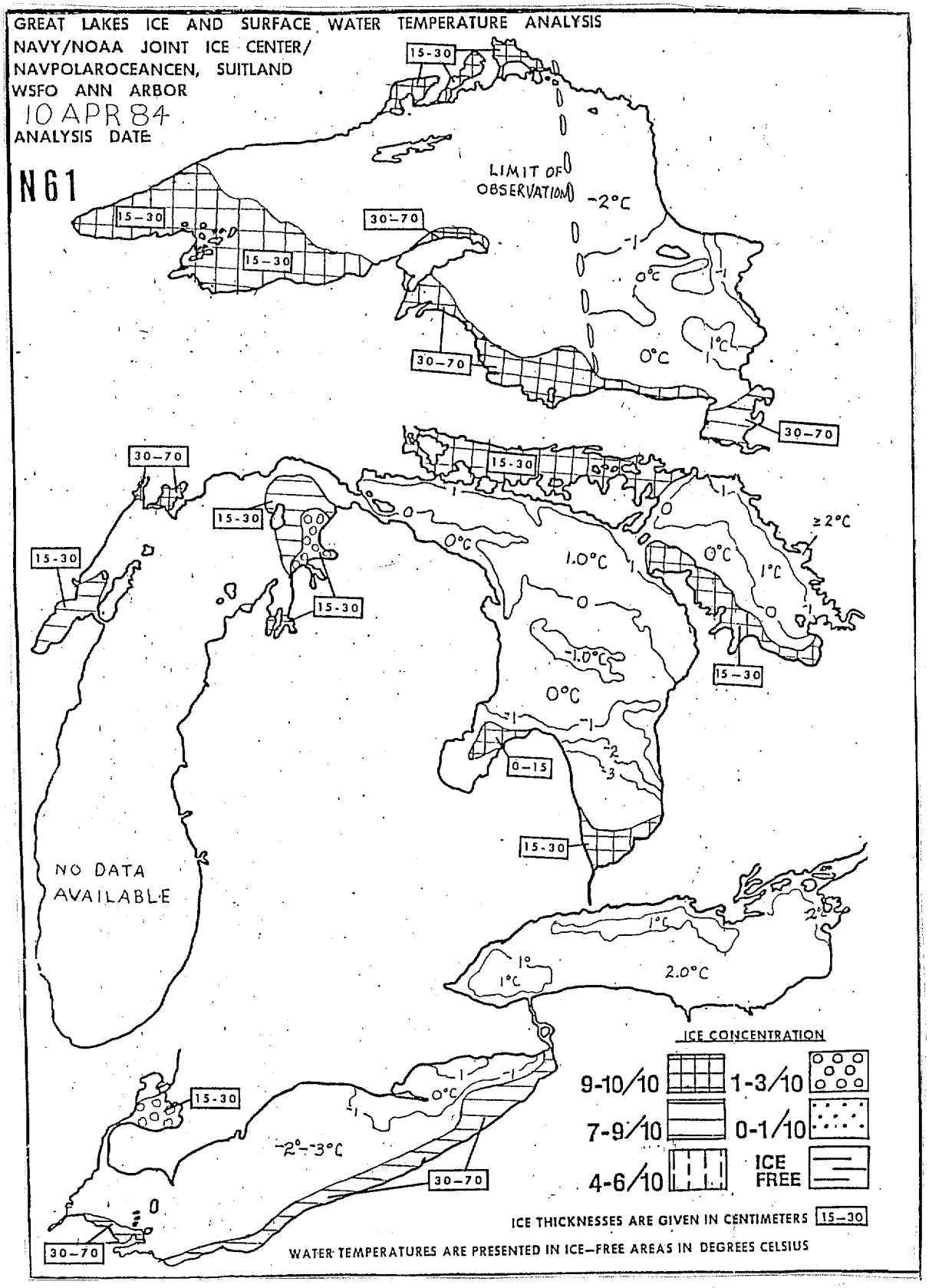
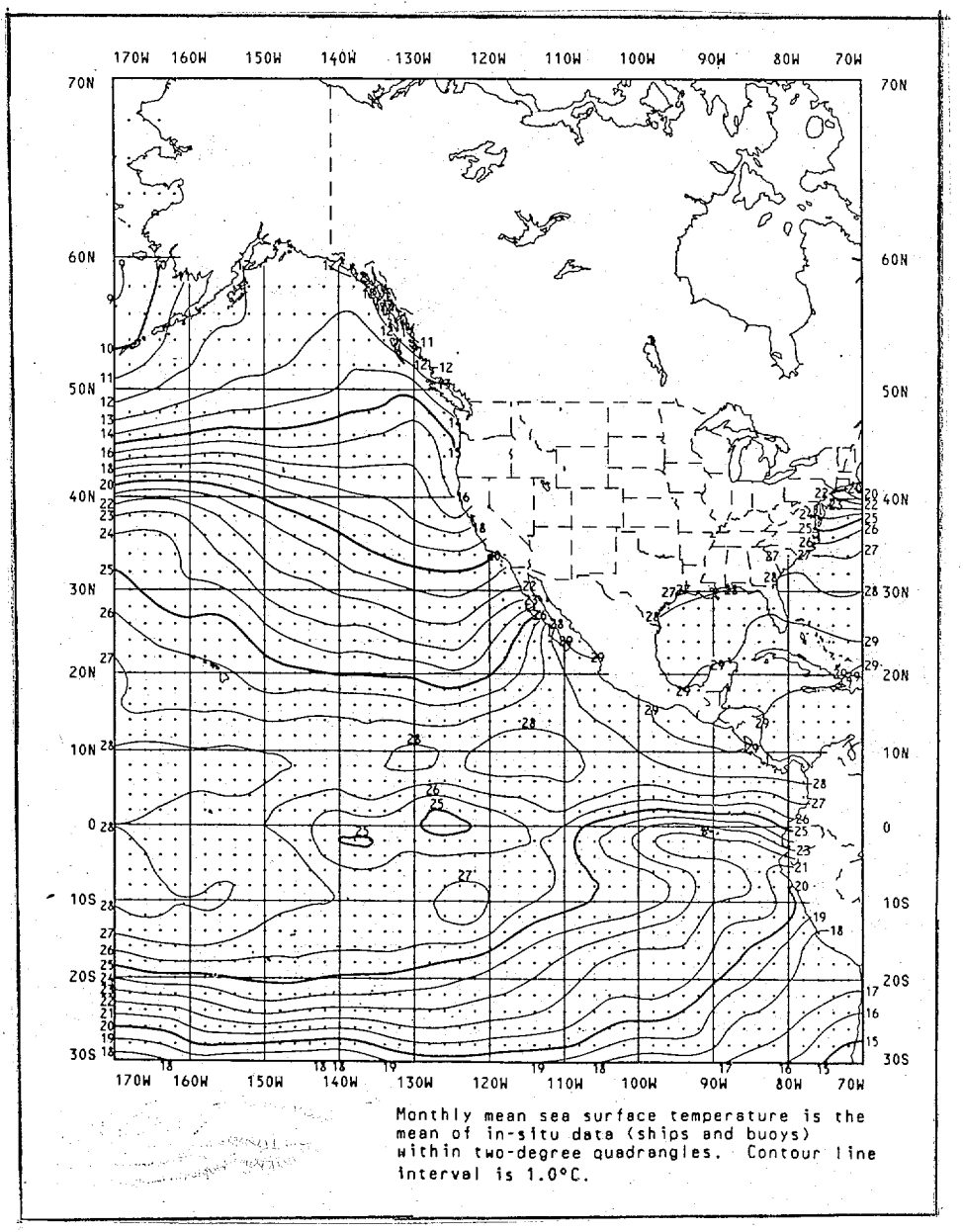


Figure 18. Great Lakes Ice and Surface Water Temperature Analysis Chart



OCEANOGRAPHIC MONTHLY SUMMARY PUBLICATION

Figure 19. Eastern Pacific Ocean (in-situ data) SST - Monthly Mean Chart

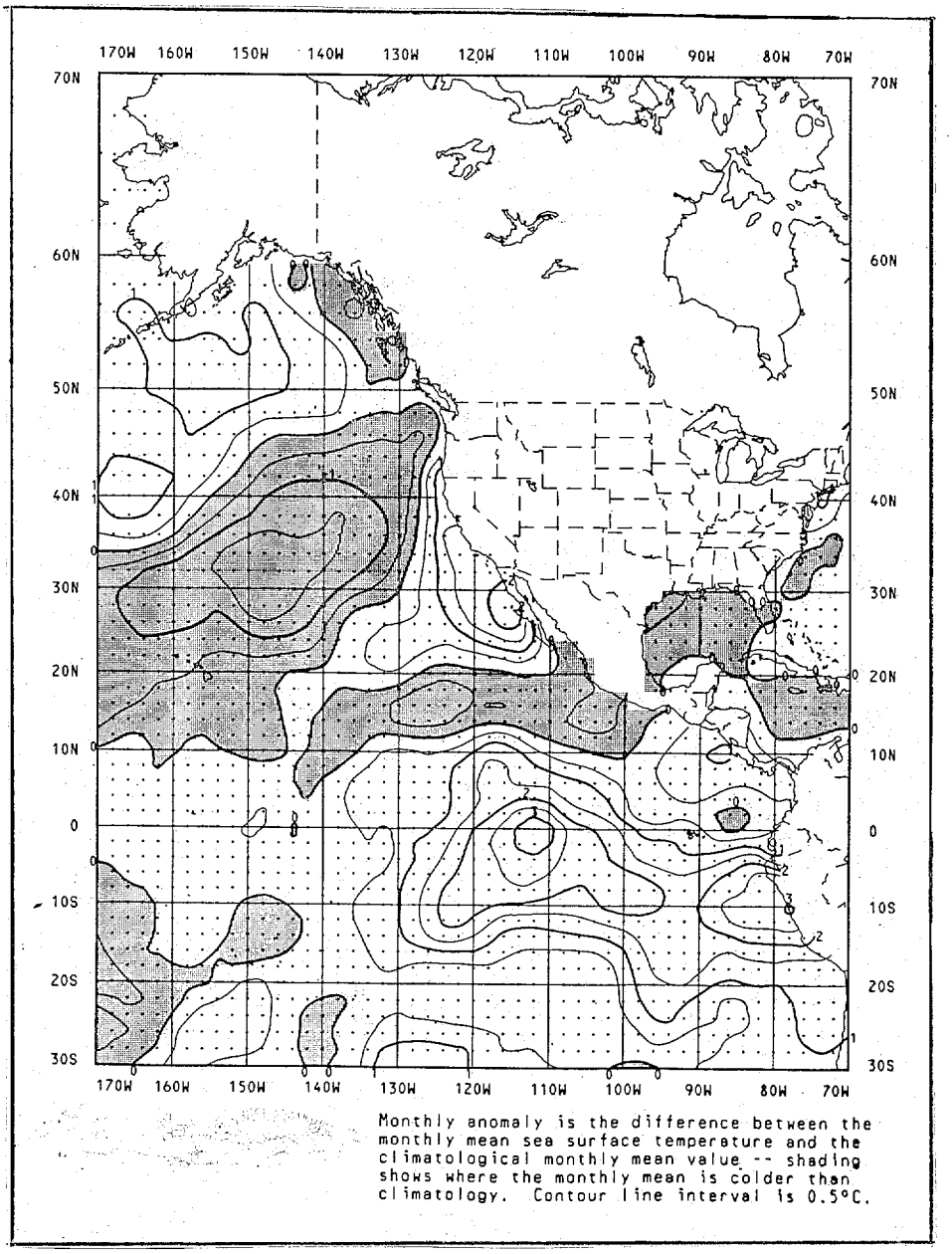


Figure 20. Eastern Pacific Ocean (in-situ data) SST - Monthly Anomaly Chart

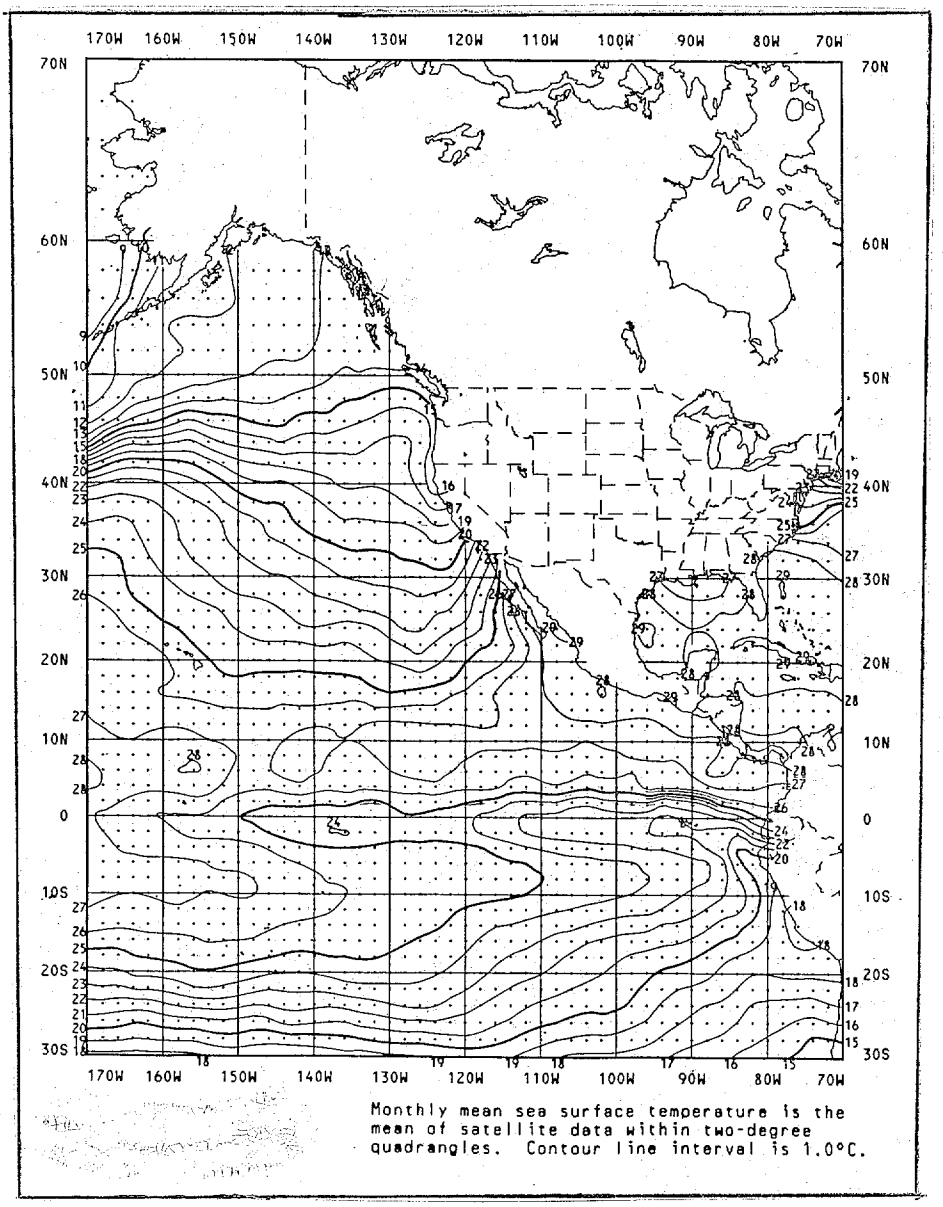


Figure 21. Eastern Pacific Ocean (satellite data) SST - Monthly Mean Chart

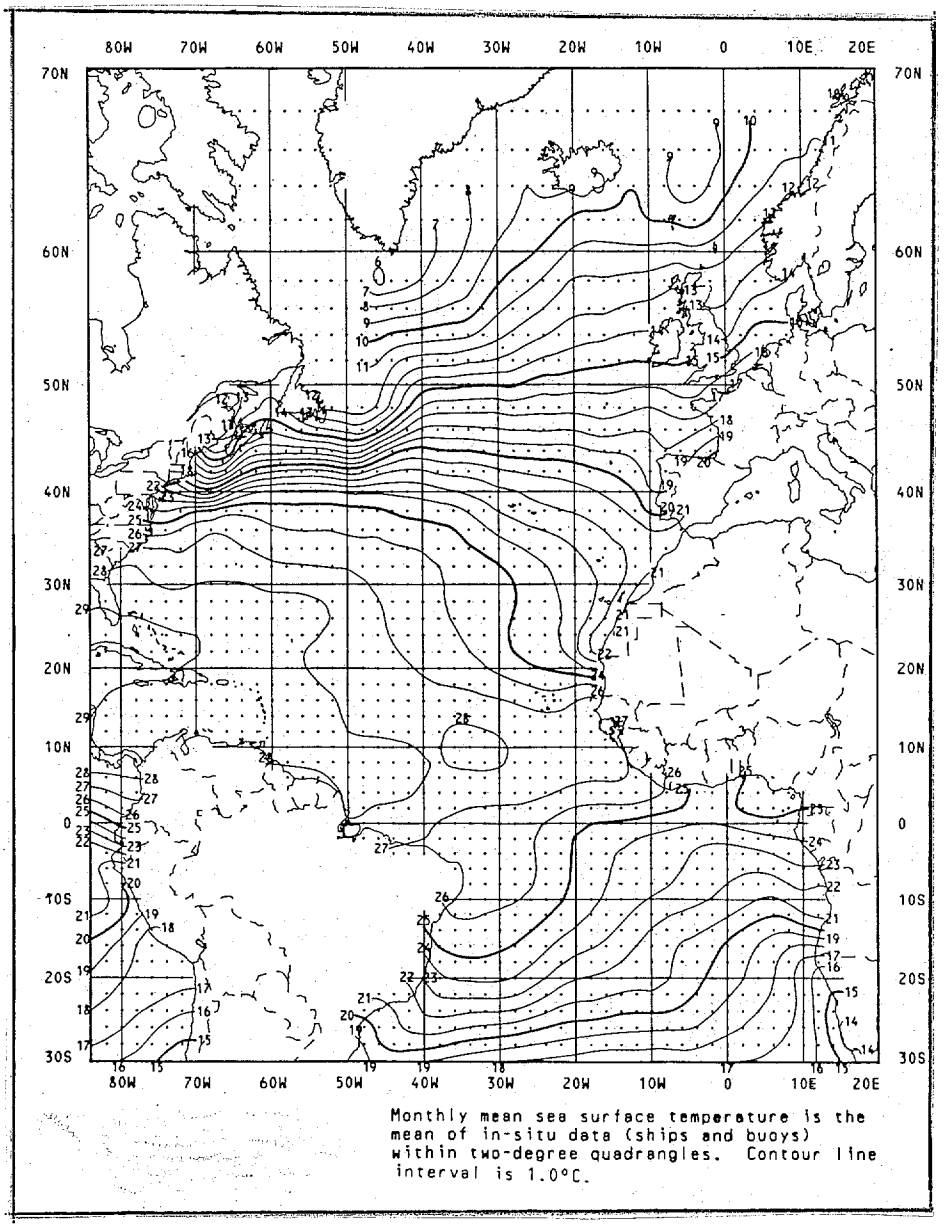


Figure 22. Atlantic Ocean (in-situ data) SST - Monthly Mean Chart

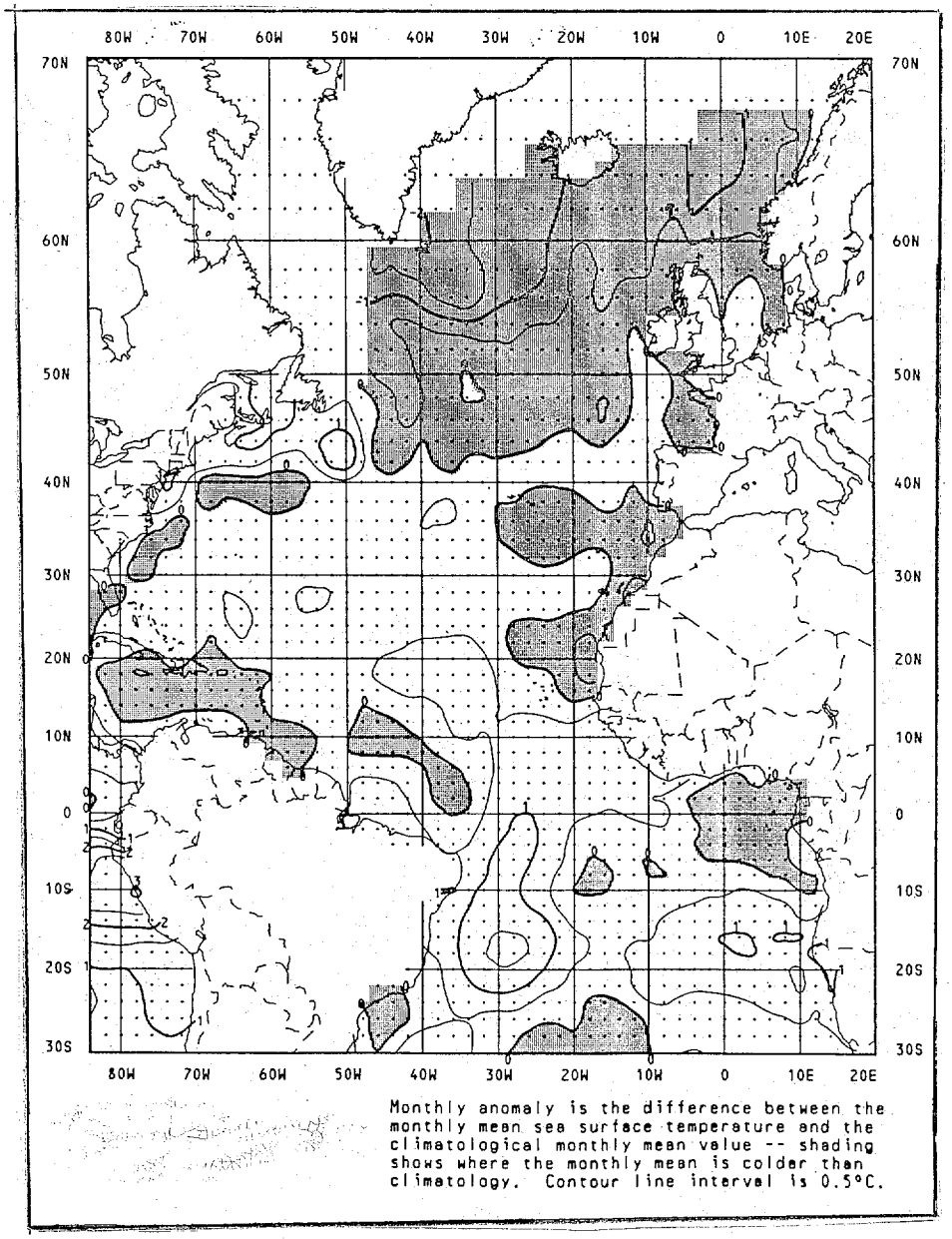


Figure 23. Atlantic Ocean (in-situ data) SST - Monthly Anomaly Chart

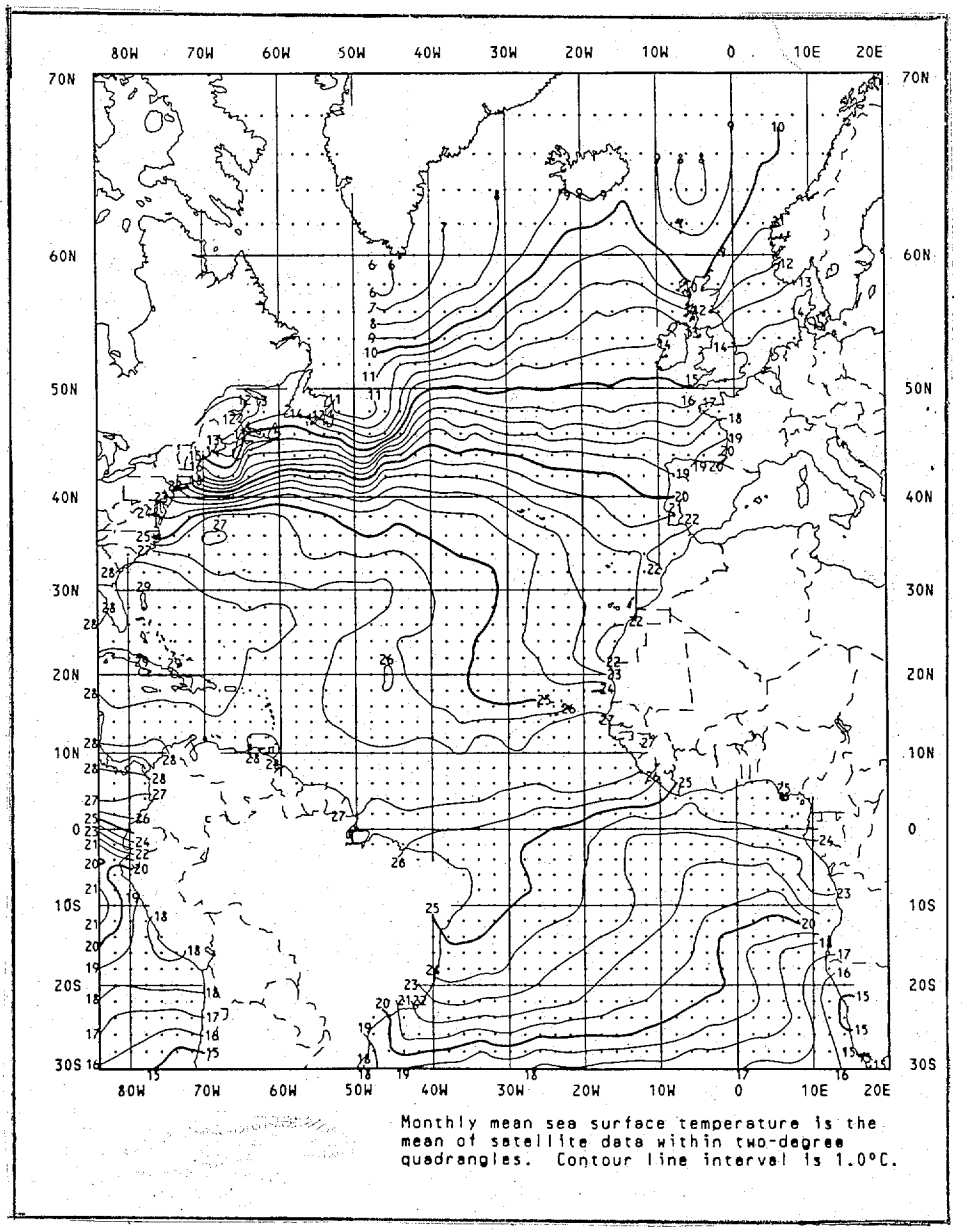
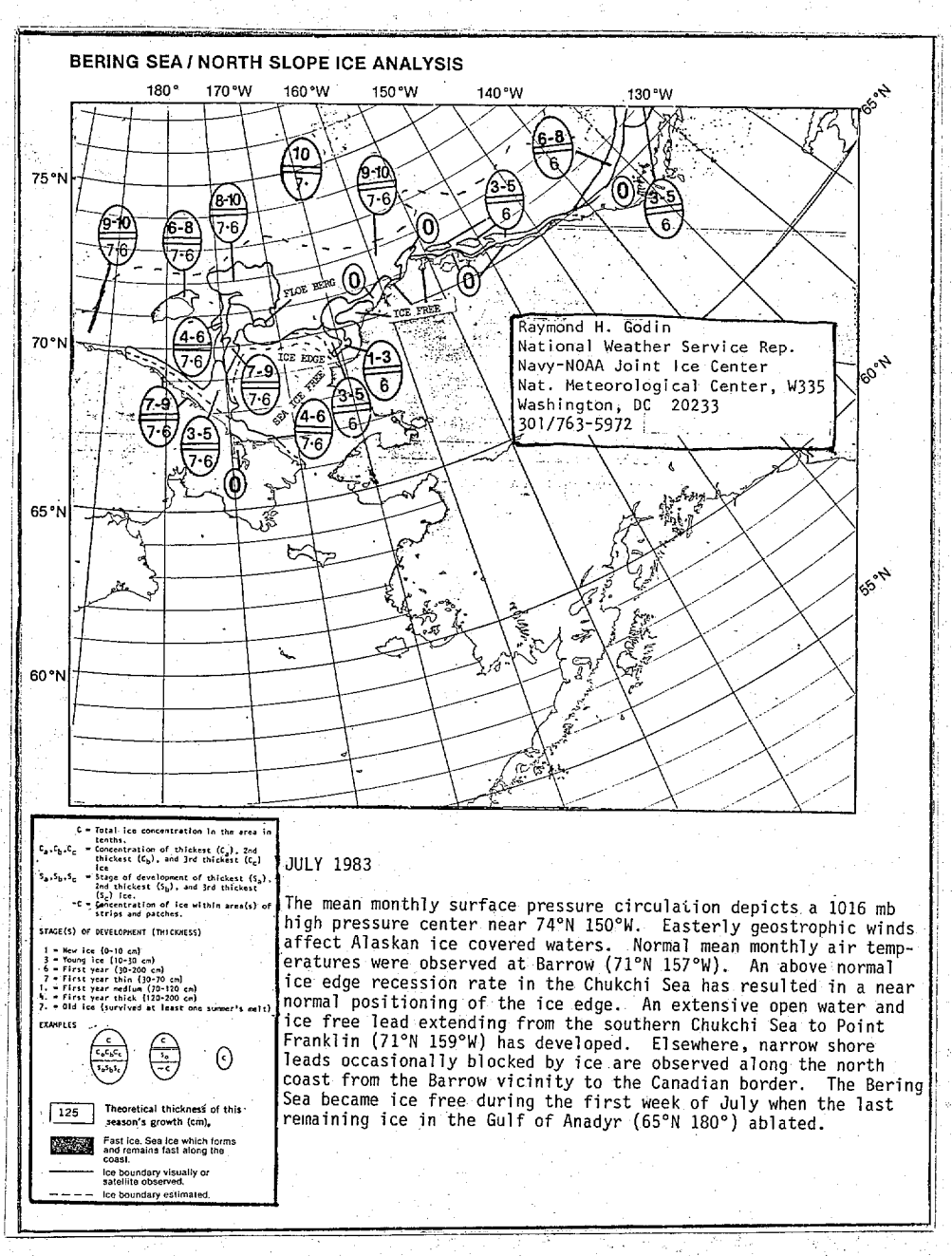


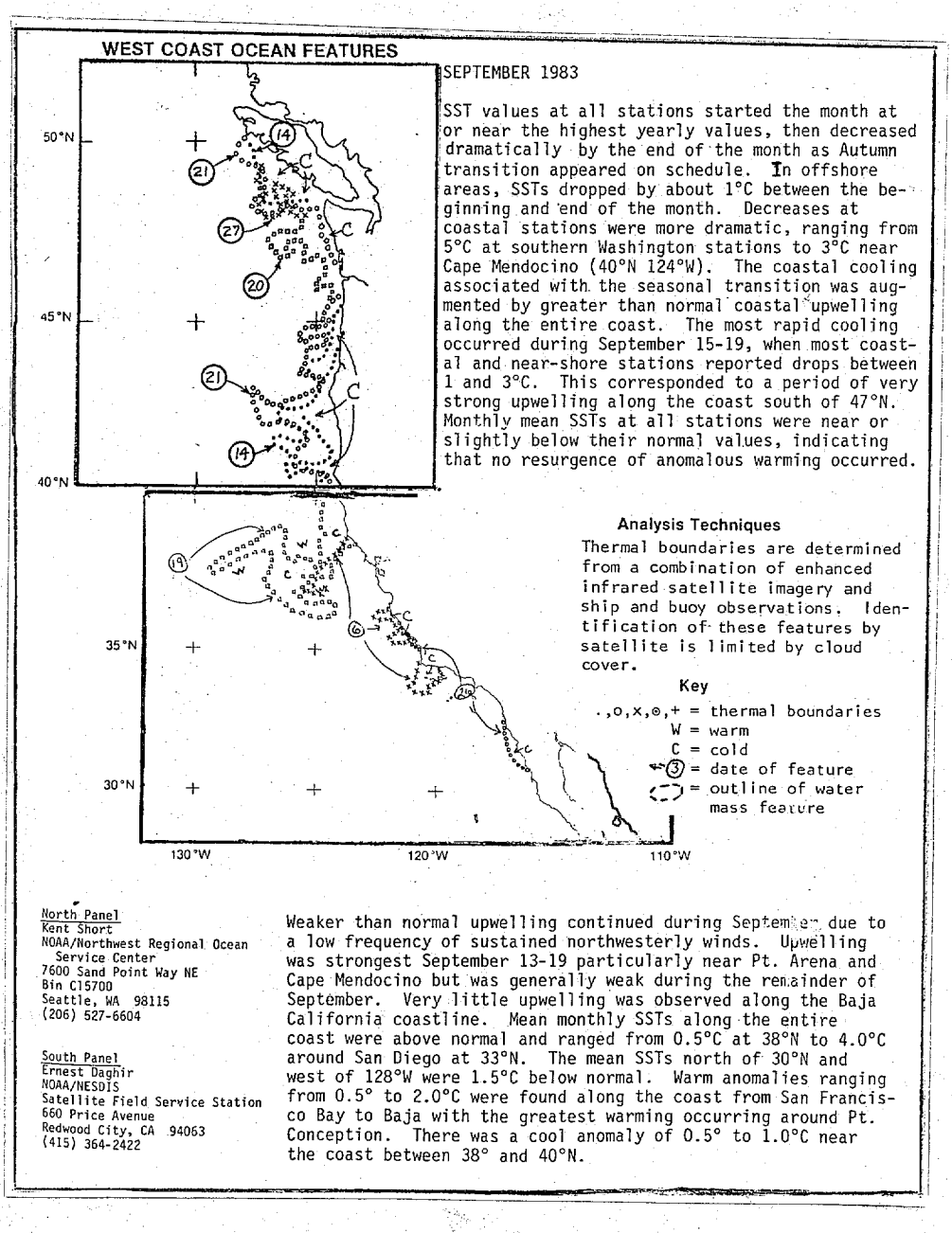
Figure 24. Atlantic Ocean (satellite data) SST - Monthly Mean Chart



JULY 1983

The mean monthly surface pressure circulation depicts a 1016 mb high pressure center near 74°N 150°W. Easterly geostrophic winds affect Alaskan ice covered waters. Normal mean monthly air temperatures were observed at Barrow (71°N 157°W). An above normal ice edge recession rate in the Chukchi Sea has resulted in a near normal positioning of the ice edge. An extensive open water and ice free lead extending from the southern Chukchi Sea to Point Franklin (71°N 159°W) has developed. Elsewhere, narrow shore leads occasionally blocked by ice are observed along the north coast from the Barrow vicinity to the Canadian border. The Bering Sea became ice free during the first week of July when the last remaining ice in the Gulf of Anadyr (65°N 180°) ablated.

Figure 25. Bering Sea/North Slope Ice Chart, with text



North Panel
Kent Short
NOAA/Northwest Regional Ocean Service Center
7600 Sand Point Way NE
Bin C15700
Seattle, WA 98115
(206) 527-6604

South Panel
Ernest Daghir
NOAA/NESDIS
Satellite Field Service Station
660 Price Avenue
Redwood City, CA 94063
(415) 364-2422

Figure 26. West Coast Ocean Features, with text

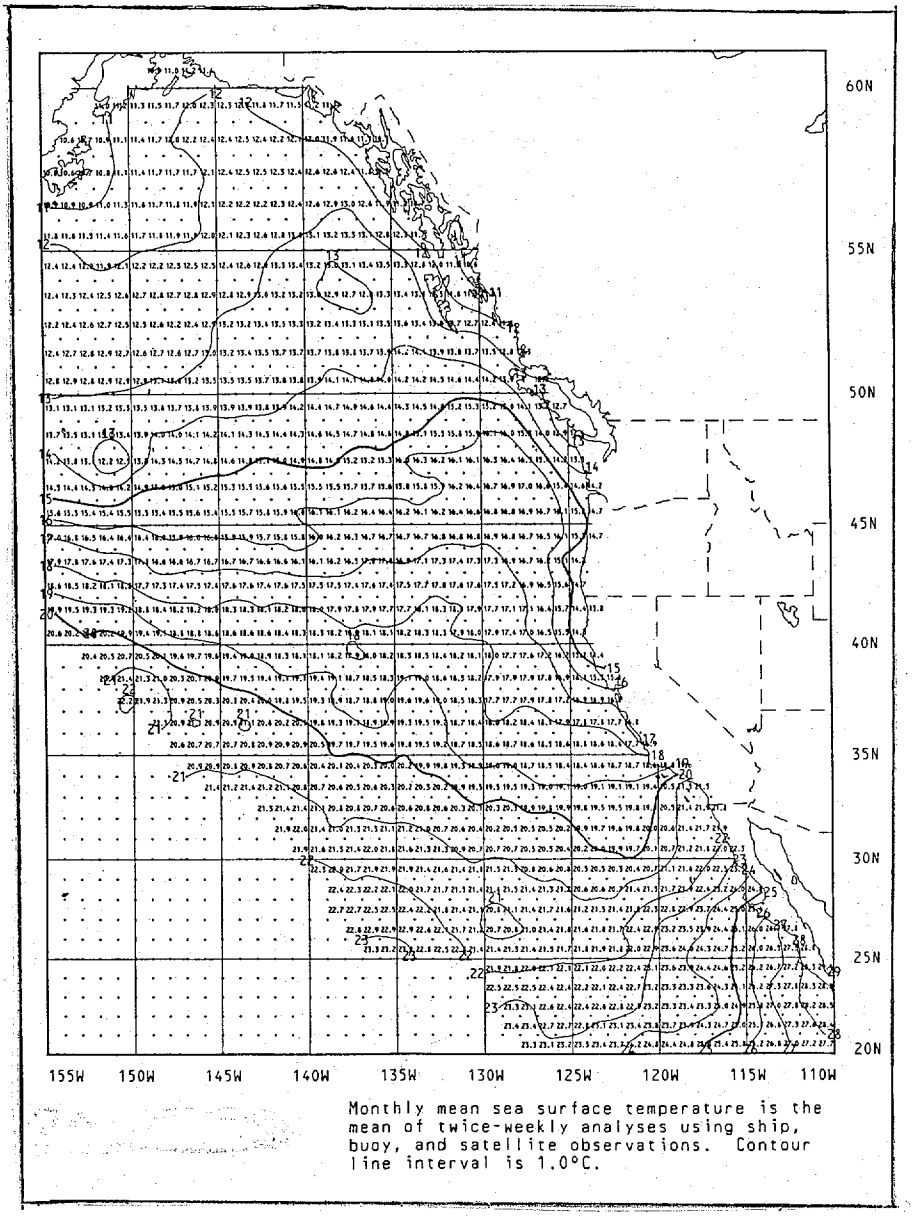


Figure 27. West Coast SST - Monthly Mean Chart

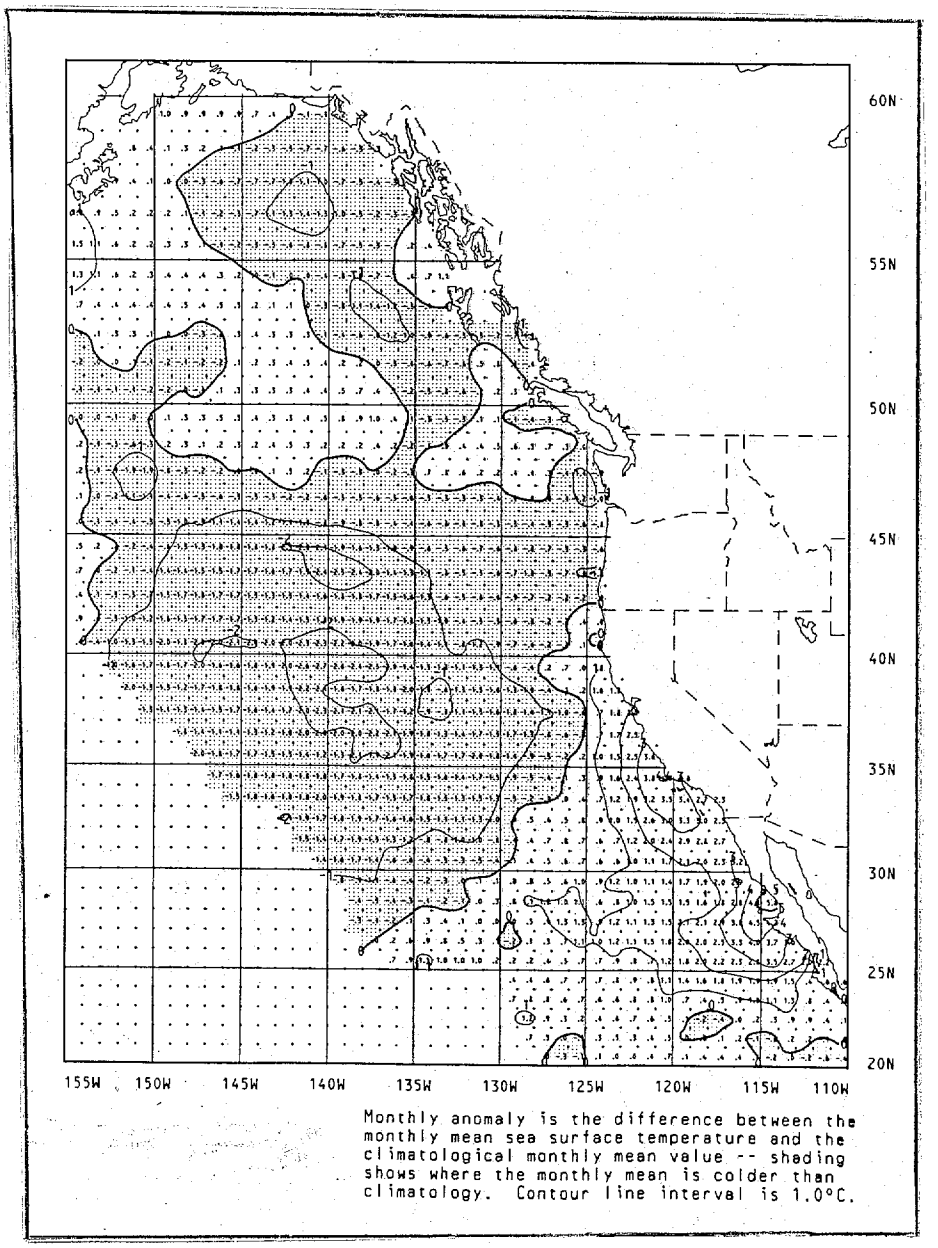


Figure 28. West Coast SST - Monthly Anomaly Chart

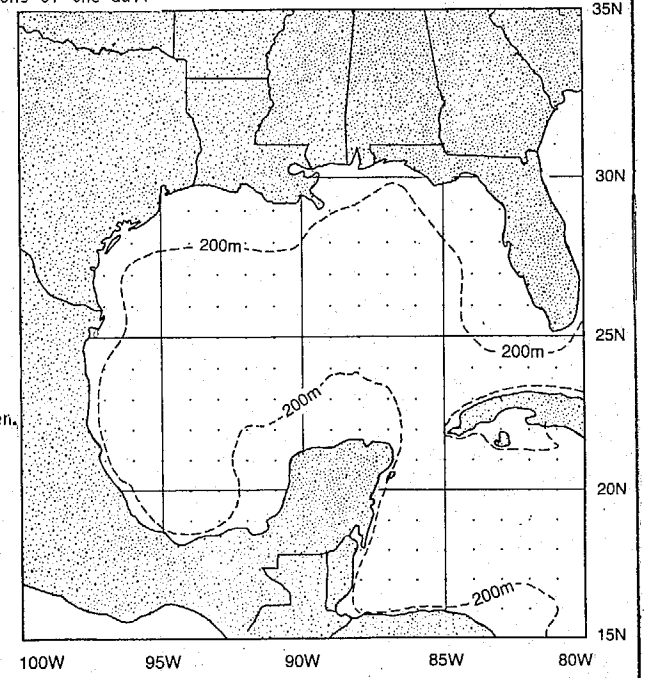
EAST COAST OCEAN FEATURES

The end of this month's positions of the Gulf Stream System and its associated eddies are shown for the NW Atlantic and the Gulf of Mexico. The Gulf Stream and Loop Current boundaries are located by infrared satellite imagery or XBT (expendable bathythermograph) data. Anticyclonic eddies are labeled a-z in the Gulf of Mexico and 1-99 in the NW Atlantic. Cyclonic eddies are labeled A-Z. Arrows on eddies indicate direction of circulation. Warm-core or anticyclonic eddies rotate clockwise; cold-core or cyclonic eddies rotate counterclockwise. The line to the eddy center shows the net translation since last month or since last observed. Eddies or sections of the Gulf Stream System which were not observed during the month are not shown on the analysis chart. The long arrows at the bottom of the chart indicate the date of data used.

Data used in this analysis include:
NOAA satellite infrared imagery, NESDIS
Bathythermograph data, National Meteorological Center of National Weather Service
Oceanographic Analysis, A daily detailed analysis issued by National Weather Service/NESDIS

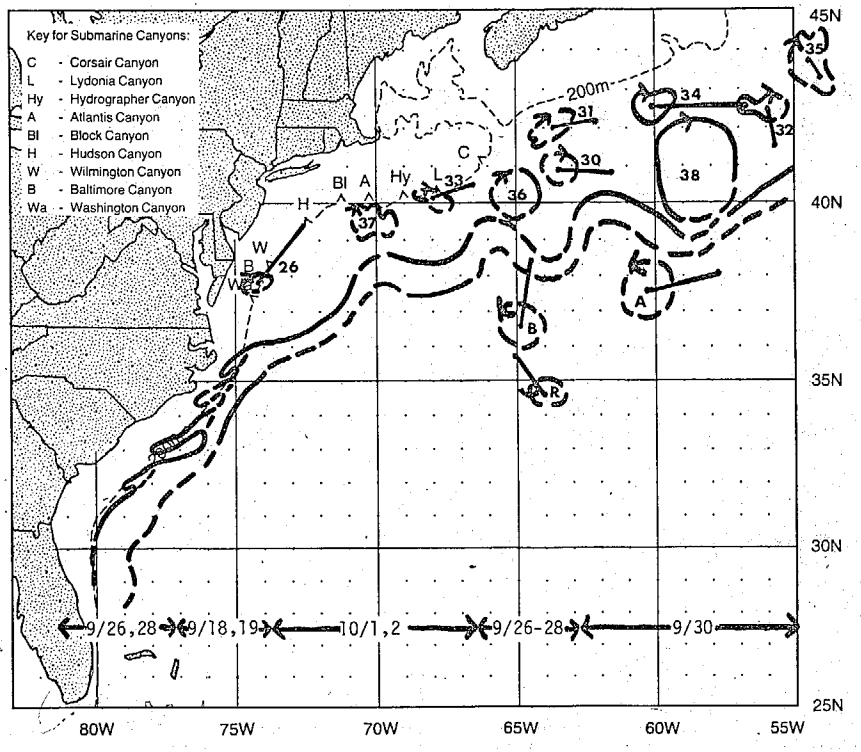
Jenifer Wartha-Clark
NOAA/NWS
Washington, DC 20233
(301) 763-8088

Ann Bell
NOAA/NWS
National Meteorological Cen.
Washington, DC 20233
(301) 763-8056



SEPTEMBER 1983

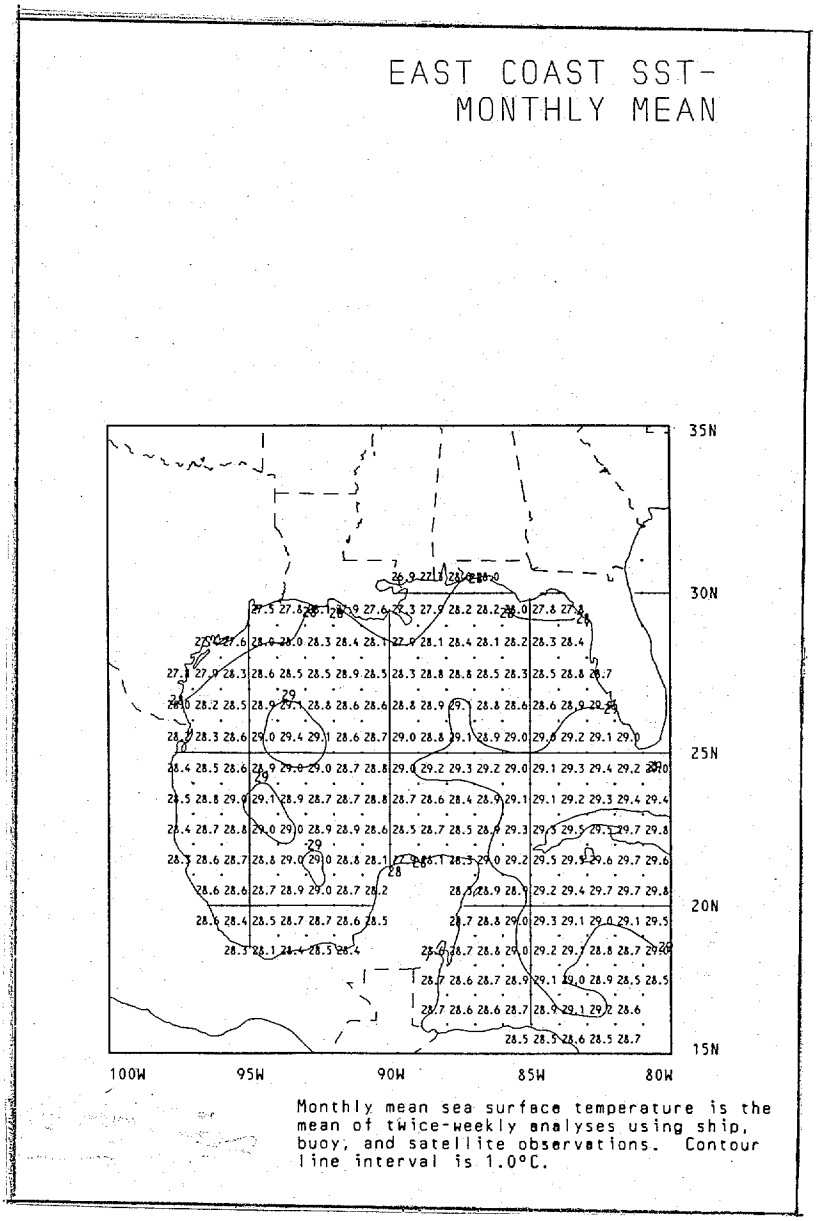
Near isothermal conditions have prevailed in the Gulf of Mexico since early July. The NOAA Data Buoy Center suspects that eddy g no longer exists. Hurricane Alicia and Barry apparently pushed the drifting data buoy out of the area. Eddy g apparently moved 85 km WSW from September 1-20 before dissipating.



One anticyclonic eddy was absorbed by the Gulf Stream and three were formed during September. Eddy 29 was absorbed by the Gulf Stream near 36°N 74°W on September 18. Eddy 36 formed from a Gulf Stream meander near 40°N 65°W on September 9. Eddy 37 apparently was formed from a long warm water filament associated with the Gulf Stream near 39°N 69°30W around September 19. Eddy 38 was formed from a Gulf Stream meander near 42°N 58°W on September 21. Two anticyclonic eddies were newly named during September. Eddy 34 was first partially observed on July 28 near 42°30N 56°30W. Its origin was not known. It was not listed as a new eddy in the August 1983 OMS because it was only observed once (during July). During September, eddy 34 was observed repeatedly. Eddy 34 translated 380 km W from July 28-September 30. Eddy 35, first observed near 43°N 54°W on July 28, moved 55 km NW by September 22. Eddy 26 moved 235 km SW. Eddy 33 moved 140 km WSW when last observed on September 16. Eddy 30 translated 180 km W. Eddy 32 translated 110 km NNW. Eddy 31 moved 130 km W when last observed on September 21. The South Wall of the Gulf Stream was last seen by satellite imagery on September 21 and 22.

One cyclonic eddy was absorbed by the Gulf Stream during the month. Eddy X was absorbed by a Gulf Stream meander near 37°N 68°W on September 5. Eddy B was absorbed by a Gulf Stream meander near 37°N 64°W on September 10 but emerged again near 37°N 65°W on September 12. Eddy B moved 225 km SSW when last partially observed on September 21. Eddy A moved 235 km WSW when last partially observed around September 12. Eddy R traveled 150 km SE when last partially observed on September 10.

Figure 29. East Coast Ocean Features, with text



EAST COAST SST MONTHLY MEAN CHARTS

Figure 30. Gulf of Mexico SST - Monthly Mean Chart

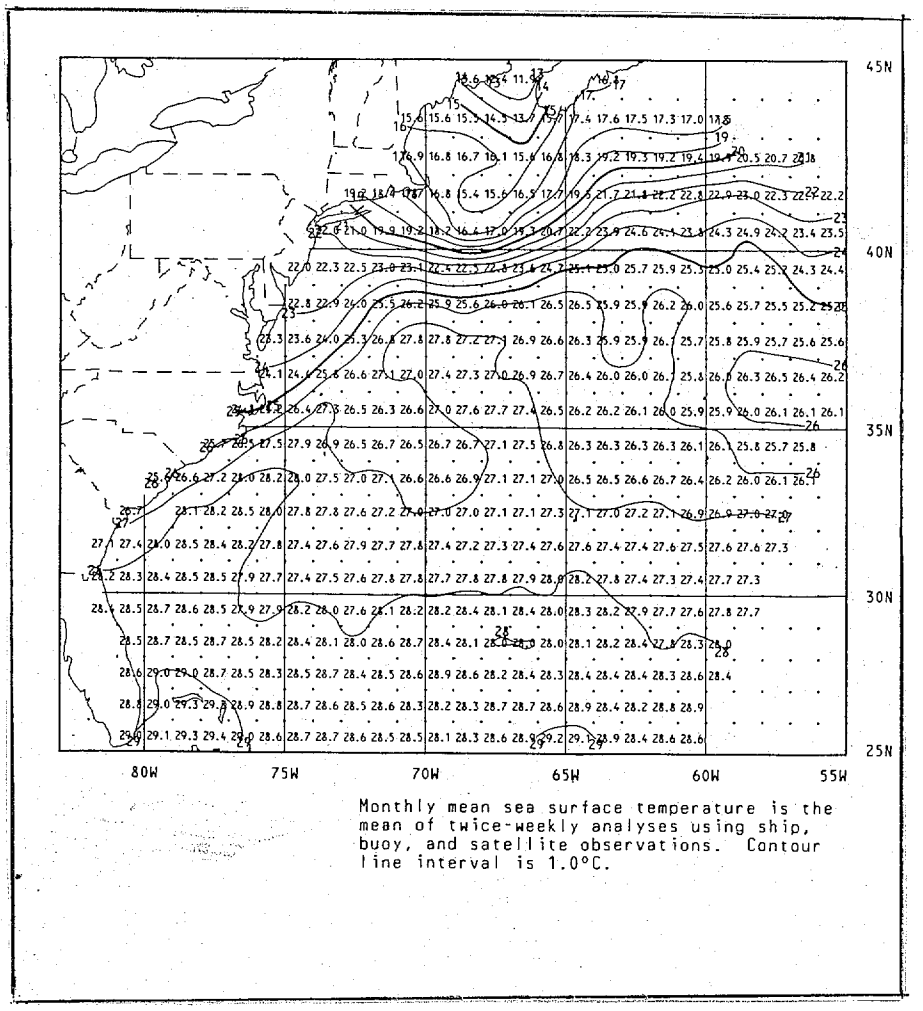


Figure 31. NW Atlantic Ocean SST - Monthly Mean Chart

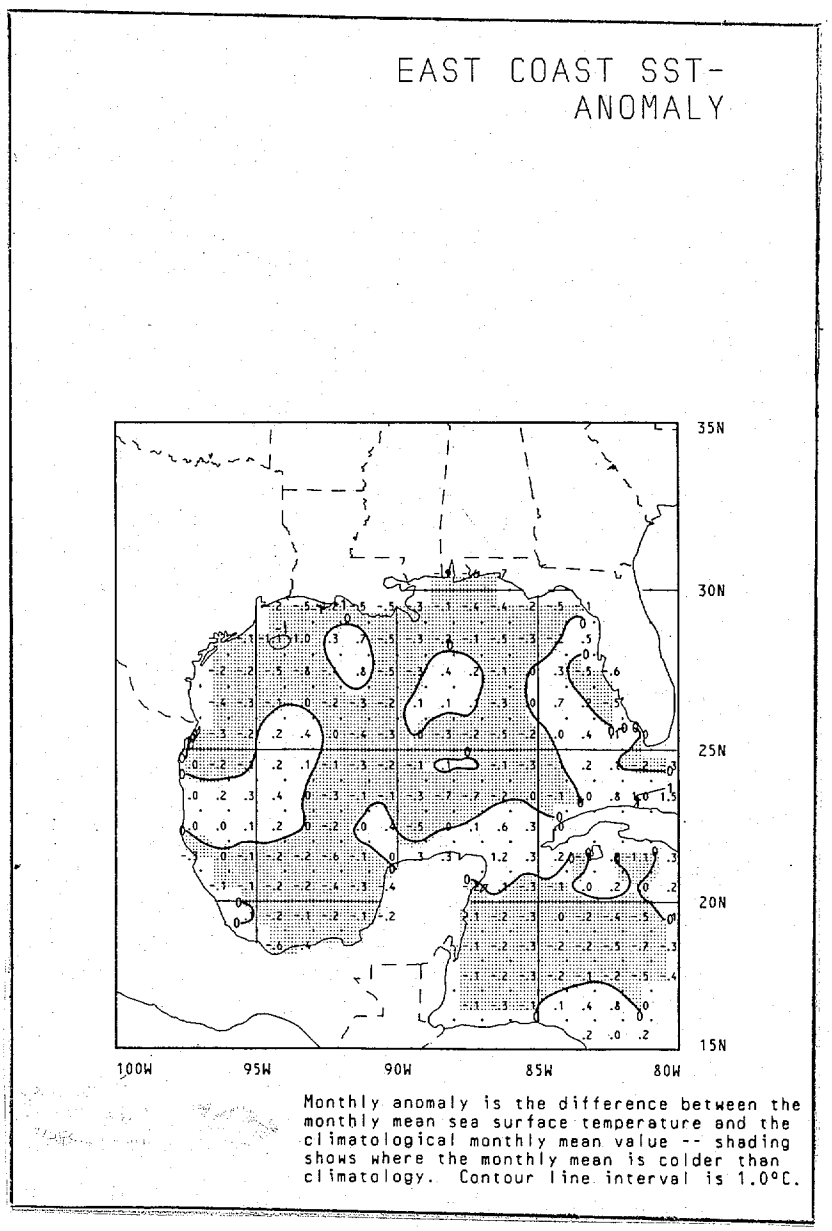


Figure 32. Gulf of Mexico SST - Monthly Anomaly Chart

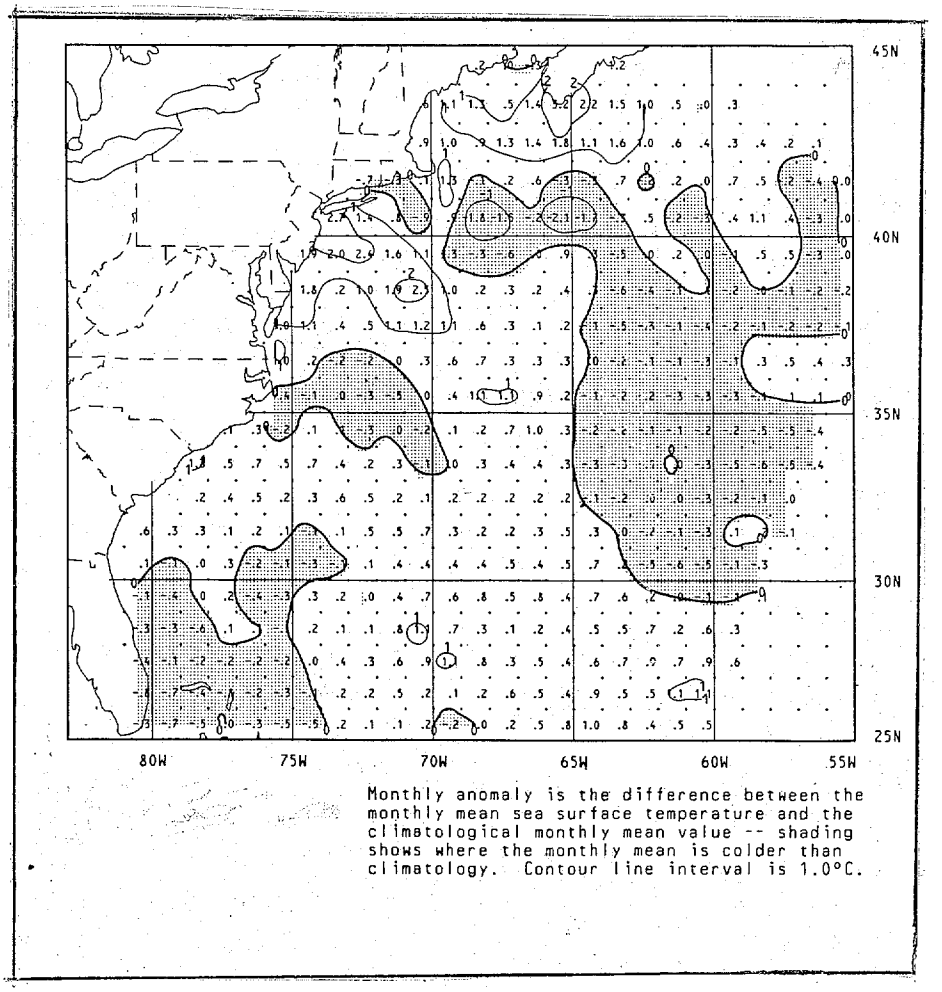


Figure 33. NW Atlantic SST - Monthly Anomaly Chart

Figure 34. Wave Spectra Measured by NDBC and NOS Buoys

Code for Non-Directional Wave Spectra

The non-directional spectral wave message consists of 2 lines, exclusive of the header, as follows:

SXVX## KWBC YYGGGG<<LF

NNNNNYYGGddffHHPP<<LF

AAAXBBBXCCCXDDDXEEEXFFFXIIIXJJJXKKKXLLLXMMMXQQQXRRRXSSSXTTTX<<LF%

Message Header

##: Bulletin number
20: Atlantic south of 35N
21: Gulf of Mexico
22: Atlantic north of 35N
23: Great Lakes
24: Pacific Region
25: Pacific Region
33: Pacific Region
40: Mid-Atlantic waverider buoys

YY: Day of month

GGGG: Hour of observation (GMT)

Control Characters

<<: 2 carriage returns

LF: Line feed

Message

NNNNN: The WMO five digit buoy location identifier (it is assumed that latitude/longitude coordinates are known).

YY: Day of month

GG: Hour of observation (GMT)

dd: True wind direction to the nearest 10 degrees

ff: Wind speed in meters per second

HH: Significant wave height in half meters

PP: Period of maximum wave energy in seconds

AAAXBBBX...(maximum of 60 characters): 15 groups of 4 characters in each group representing the energy density in meters ^{2}/Hz for each of 15 spectral bands ordered by increasing period as indicated in the attached table. The first 3 characters in each group are the mantissa. A decimal point is assumed to exist to the left of each group. Exponents are interpreted as follows:

$0 = 10^0 = 1$	$5 = 10^{-1} = 0.1$
$1 = 10^1 = 10$	$6 = 10^{-2} = 0.01$
$2 = 10^2 = 100$	$7 = 10^{-3} = 0.001$
$3 = 10^3 = 1000$	$8 = 10^{-4} = 0.0001$
$4 = 10^4 = 10000$	$9 = 10^{-5} = 0.00001$

Examples:

3216 = .00321 m^2/Hz
5273 = 527 m^2/Hz
2190 = .219 m^2/Hz

A 4-character spectral group in which energy density is less than 10^{-5} m^2/Hz will be indicated by a single slash (/). However, if this occurs in successive groups out to the end of the message, no information of any kind will be included (i.e., the message will end with the last reported energy group).

Control Characters

<<: 2 carriage returns

LF: Line feed

%: Percent sign at end of last report in the bulletin indicating end of bulletin

Code for Directional Wave Spectra

The directional spectral wave message is similar to the non-directional code. The number of spectral bands, the band widths, and central periods are identical (as indicated in the attached table). However, each spectral band has associated with it a dominant wave direction. In addition, both mean and dominant periods and directions are reported for the entire spectrum. The directional message consists of 2 lines, exclusive of the message header as follows:

SXVX## KWBC YYGGGG<<LF

NNNNNYYGGddffHHH$P_MP_MD_MD_MP_DP_DD_DD_D$AAAXDDBBBXDDCCCXDDEEEXDDFFFXDD<<LF

IIIXDDJJJXDDKKKXDDLLLXDDMMMXDDQQQXDDRRRXDDSSSXDDTTTXDDUUUXDD<<LF%

Message Header and Control Characters

Same meaning as in the non-directional code except that ## will be:

30: Pacific Region

31: Atlantic/Gulf of Mexico

Message

The first 15 characters have the same meaning as in the non-directional code.

P_MP_M: Mean wave period in seconds

D_MD_M: Mean wave direction to $\pm 2.5^o$ accuracy using the algorithm D_MD_M = (Direction/5) + 0.5.

Examples: $D_MD_M = (87^o/5) + 0.5 = 17.9 = 17$
$D_MD_M = (88^o/5) + 0.5 = 18.1 = 18$

To obtain direction, multiply by 5.

P_DP_D: Dominant (peak) wave period in seconds

D_DD_D: Dominant (peak) wave direction expressed in the same manner as in D_MD_M above. To obtain direction, multiply by 5.

AAAXDDBBBXDD....(maximum of 90 characters): 15 groups of 6 characters in each group representing the energy density and dominant wave direction for each of 15 spectral bands ordered by increasing period as indicated in the attached table. The first 4 characters are the same as described in the non-directional spectrum format. The last 2 characters (DD) in each group represent the dominant wave direction for that spectral band. To obtain direction, multiply by 5.

Examples: 321615 = .0032 m^2/Hz from 75^o
527325 = 527 m^2/Hz from 125^o
219072 = .219 m^2/Hz from 0^o

If a group contains a value for energy density, but the dominant wave direction is indeterminate, DD will be encoded as 99. A 6-character spectral group in which energy density is less than 10^{-5} m^2/Hz will be indicated by a single slash(/). However, if this occurs in successive groups out to the end of the message, no information of any kind will be included (i.e., the message will end with the last reported energy group).

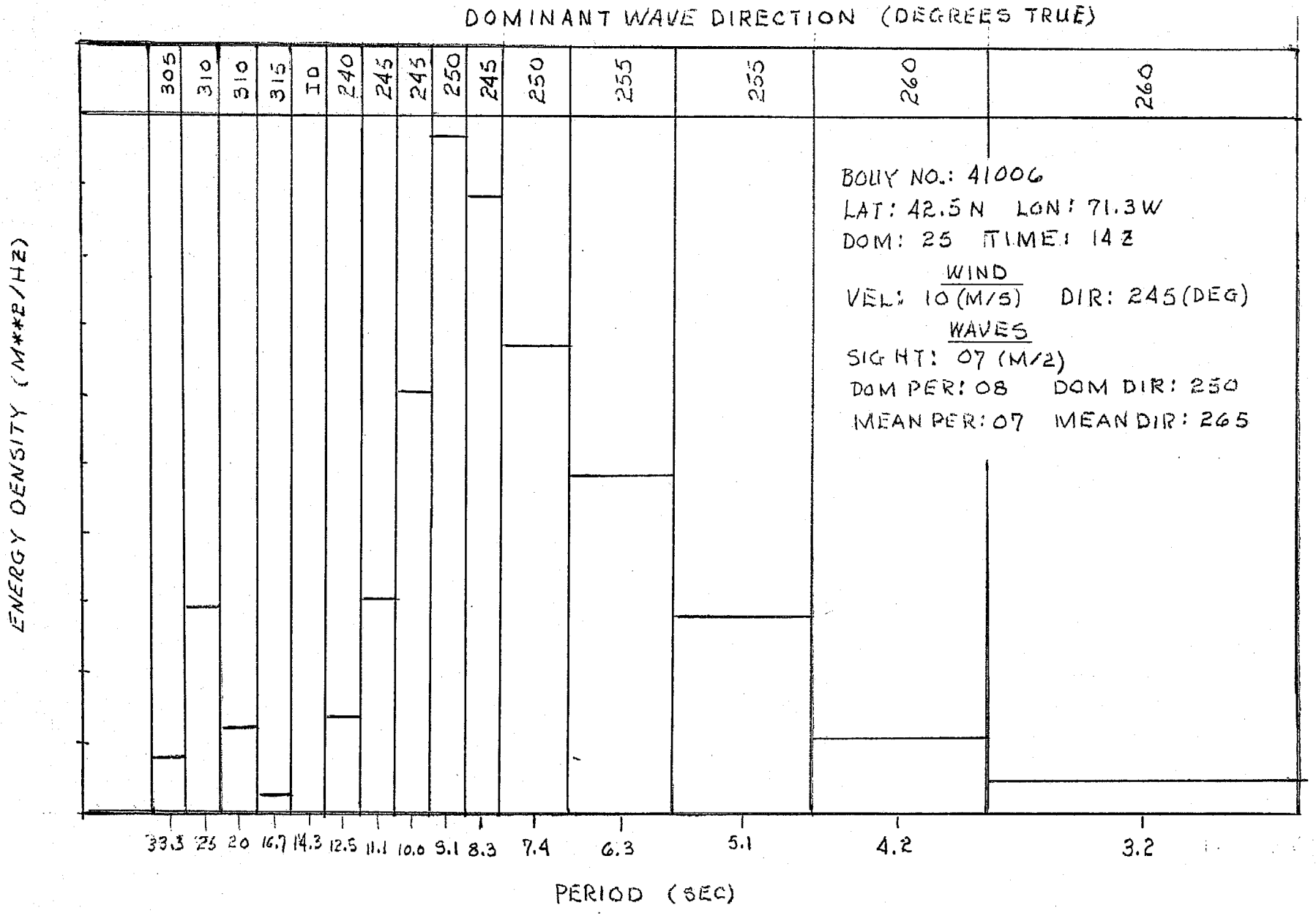
Control Characters

Same as in the non-directional code.

Fifteen Band Spectrum Corresponding to the 15 Groups (AAAX, BBBX, etc.) in the Coded Messages

NOTE: These values are fixed and therefore are not included in the message code.

Band No.	Nominal Central Period(Sec)	Central Period (Sec)	Central Freq. (Hz)	Band Width (Hz)	Band Limits (Hz)	Nominal Period Limits (Sec)
1	3.2	3.2258	0.310	0.09	0.355-0.265	2.8-3.8
2	4.2	4.1667	0.240	0.05	0.265-0.215	3.8-4.7
3	5.1	5.1282	0.195	0.04	0.215-0.175	4.7-5.7
4	6.3	6.2500	0.160	0.03	0.175-0.145	5.7-6.9
5	7.4	7.4074	0.135	0.02	0.145-0.125	6.9-8.0
6	8.3	8.3333	0.120	0.01	0.125-0.115	8.0-8.7
7	9.1	9.0909	0.110	0.01	0.115-0.105	8.7-9.5
8	10.0	10.0000	0.100	0.01	0.105-0.095	9.5-10.5
9	11.1	11.1111	0.090	0.01	0.095-0.085	10.5-11.8
10	12.5	12.5000	0.080	0.01	0.085-0.075	11.8-13.3
11	14.3	14.2857	0.070	0.01	0.075-0.065	13.3-15.4
12	16.7	16.6667	0.060	0.01	0.065-0.055	15.4-18.2
13	20.0	20.0000	0.050	0.01	0.055-0.045	18.2-22.2
14	25.0	25.0000	0.040	0.01	0.045-0.035	22.2-28.6
15	33.3	33.3333	0.030	0.01	0.035-0.025	28.6-40.0


DOMINANT WAVE DIRECTION (DEGREES TRUE)
305
310
310
315
ID
240
245
245
250
245
250
255
255
260
260
BOUY NO.: 41006
LAT: 42.5 N LON: 71.3 W
DOM: 25 TIME: 14 Z
WIND
VEL: 10 (M/S) DIR: 245 (DEG)
WAVES
SIG HT: 07 (M/2)
DOM PER: 08 DOM DIR: 250
MEAN PER: 07 MEAN DIR: 265
ENERGY DENSITY (M**2/HZ)
33.3 25 20 16.7 14.3 12.5 11.1 10.0 9.1 8.3 7.4 6.3 5.1 4.2 3.2
PERIOD (SEC)

REFERENCES

Gemmill, W. H., Auer, S. J., 1982: Operational Regional Scale Surface Temperature and Ocean Feature Analysis. First Inter. Conf. on Meteorology and Air/Sea Interaction of the Coastal Zone, pp. 290-295.

Gemmill, W. H., Larson, S. E., 1979: Real Time Ocean Thermal Structure Analysis. Papers submitted to the Joint IOC/WMO Seminar on Oceanographic Products and the IGOSS Data Processing and Services System, Workshop Report No. 17, Moscow, pp. 115-142.

Gerald, V. M., 1984: Real-Time Bathythermograph Analysis, NOAA Office Note 290, National Oceanic and Atmospheric Administration, U. S. Department of Commerce, Washington, D. C., 16 pp.

Reynolds, R. W., 1982: A Monthly Averaged Climatology of Sea Surface Temperatures; NOAA Technical Report NWS 31.

Robinson, M., 1976: Atlas of North Pacific Ocean Monthly Mean Temperatures and Mean Salinities of the Surface Layer; Naval Oceanographic Office Reference Publication 2.

Robinson, M., Bauer, R., and Schroeder, E. H., 1979: Atlas of North Atlantic-Indian Ocean Monthly Mean Temperatures and Mean Salinities of the Surface Layer; Naval Oceanographic Office Reference Publication 18.